MANUFACTURE

FOOD MANUFACTURE

Incorporating Food Industries Weekly

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FOOD MANUFACTURE

Vol. XXIV, No. 5 May 1, 1949

Wheat Dilemma

IT is evident that, despite the hope that the new wheat agreement will be ratified, our own wheat position is by no means secure for the indefinite future. The smallness of the Canadian consumer market and the fact that we have to use Marshall dollars for Canadian wheat are gradually leading us into a dilemma. The United States may well show this year a considerable surplus both of wheat and maize; this may limit the availability of dollars for the purchase of "offshore" wheat from Canadian farms. The American Department of Agriculture will doubtless wish to cut back wheat production in 1950 by 20 per cent. or so; that at all events is the considered opinion. The Department is aware, however, that there is usually a lag between its intentions and the possibility of realising them in terms of farm production.

We are still faced with a probable grain deficit in several countries; theoretically this should make any attempt to curtail production in North America an exceedingly precarious undertaking. But if Congress is intransigeant about its wheat surplus, we should have apparently only two alternatives: either we acquire American wheat and upset the Canadian market, or else some new and at present unimaginable form of agreement will have to be made with Canada.

The perturbation felt by the Ministry of Food about the prospect seems to be reflected in the tone of a release of mid-March. "Is the Dominion wise," asks the writer, "in continuing to rely on a large market in the United States or the restoration of the old pattern of trade, once the breathing space of Marshall Aid is at an end? In the past the U.S. market for Canadian goods has proved unstable and, come what may, it seems clear that the American Union can never provide an outlet for Canada's wheat crop." Moreover, since it seems improbable that the Australian contribution will rise above 1½ million tons, we still have the obdurate need of 4 to 4½ million tons of wheat from the Transatlantic source.

The Government has its eye upon the 2 million tons claimed by Russia as her exportable surplus and a further possible million tons from the Balkans. It would be convenient if we could escape the dollar by a series of barter agreements with the East by 1950 or 1951. But here we are confronted with the difficulty that the East may want commodities we are forbidden by agreement to export to those countries.

Unless the spring acreage under wheat in our own country exceeds present expectations, we shall be more dependent upon imported wheat this year than we should prefer to be. The acreage under winter wheat was only 75 per cent. of what it had been a year earlier, and only about 65 per cent. of the target. This represents a potential loss of half a million tons which will have to be secured from overseas.

It is believed that the very rumour of an American surplus, which itself disturbs our Ministry, is causing farmers to add their own quota of headache to our food affairs.

Rump Steak, 1952-53?

One of the most noted agricultural writers of his day once said "God sendeth and giveth both mouth and meat." That was Thomas Tusser and he lived in the sixteenth century when the population of London was only some 100,000 and when we had far more soil to develop for farming. Nevertheless, most of us might have agreed with Tusser until quite recently.

The stark fact of our times is that Britain is not a country with a Divine Right to meat supplies, and if today we sought some heavenly quotation that was relevant to our meat position it would either be of the profane variety or the old saying that "God helps those who help themselves." We are reminded of a story of some past crisis debated in the House of Lords. The Government spokesman finally observed that the matter was in the hands of God, whereupon one of the noble lords shuddered and said he had never realised the situation was as desperate as that.

However, a recent debate on agricultural matters in the House of Lords was much more realistic, particularly Viscount Bruce's survey and analysis

of our long-term meat prospects. Here indeed were hard facts and common sense. The official estimate of Britain's meat consumption in 1952-53 is between 3,000,000 and 3,300,000 tons; there have been two Government statements about this, hence the double figure.

The most optimistic target for home production by 1952 or 1953 was the restoration of our pre-war output. Even allowing for this considerable addition to our 1948 supply, there remained a gap of at least 800,000 tons to be filled. Where was this extra quantity to come from? We certainly could not hope for more than 100,000 tons above pre-war imports from Europe. We should be foolish to expect Canada and America together to be able to supply more than they were now supplying—Canada could not increase exports of meat much further and America had never been a big exporter of meat to this country. New Zealand could perhaps increase her magnificent effort and we might hope at the most for 50,000 tons more.

South America? We had to realise that there a rapidly rising population was expanding its industrialisation and more and more meat was being eaten by South Americans. Ignoring matters of negotiation in the long-term view, we could not sensibly estimate more than 400,000 tons per annum—something rather better than in 1948 but considerably below pre-war supply.

When we added up all these maximum hopes we were still left with a gap of 550,000 tons if the consumption in 1952 or 1953 was to be some 3,000,000 tons. "I suggest," said Viscount Bruce, "that Australia is the place where we might do something." Reports already available showed Australia's beef cattle population could be increased from 6,500,000 to 16,000,000 in a relatively few years, and that would mean that her meat exports could rise from 250,000 tons to 700,000 tons. Australia was ready and willing to invest enormous capital in this plan provided that Britain would guarantee the market for the meat. We could not expect Australia to spend £50,000,000 developing her northern cattle industry only to find her production cut out or undersold in later years by the Argentine producers. There had to be a long-term agreement and Britain, not Australia, must bring such an agreement into existence.

That was the factual but eloquent plea of Viscount Bruce. In itself yet another great Commonwealth contribution to our post-war plight. We would add to it by requoting the saying, "God helps those who help themselves." We cannot evade our present deficiency of meat. We can at least look ahead and help in developing production which would be offered exclusively to Britain.

Debunking Vitamin A

It is indeed disconcerting and often painful when somebody pulls away the chair you are about to sit in. In social life the operation is considered to be in rather poor taste. However, the diplomatic preface to the recent Medical Research Council Report on vitamin A seems to have confused social and scientific customs; certainly, we do not see why it should try so hard to conceal the fact that the war-time research of the Sorby Institute (a converted villa in Sheffield) has pulled the chair away from authoritative opinion about vitamin A. It is the function of research to discover new facts, and when they happen to be disconcerting and painful the temporary discomfort must be accepted. In the more popular Press comments have concentrated upon the "human" side of the experiment in which some twenty conscientious objectors voluntarily submitted to the risks of a long-term deficiency diet. It has therefore escaped general attention that a *real* test with *real* adult humans has blown holes in previous opinion about vitamin A requirements.

The harsh truth is this. When these volunteers were fed on a diet practically devoid of vitamin A and carotene for up to 18 months (and 2 years in one case) few of the accepted symptoms of vitamin A deficiency occurred! There was so slight a confirmation of previously held opinions that either the experiment or those opinions must be liquidated. And it seems to us that the point at issue is a very large one. For, if it is the previous opinions that must go, it suggests that a major experiment with human "guinea-pigs" has dropped an untidy question-mark on all the pages of vitamin biochemistry. Conclusions which have been reached by our partial methods of enquiry, by tests with rats and other laboratory animals, by measurements of chemical kind based upon original biological checks (again with animals more than with humans), and by clinical studies of chronic malnutrition, do not give a picture in true or normal perspective. For put that picture to the test—the critical test of human volunteers—and it is found to be somewhat spurious.

The report's preface says: "It is clear that vitamin A deficiency is much less easily or rapidly induced in hitherto well-fed adults than has previously been supposed. . . ." Then, only a few lines later, it continues: "The positive findings were too scanty to justify a precise estimate of the requirements of vitamin A or carotene and the tentative recommendations subsequently

made . . . allow a generous margin of safety and do not conflict with previous authoritative opinion." Indeed, how diplomatic! The experiment having produced negative results of a most unexpected nature, it is hardly surprising that positive results should be scanty. By stressing this lack of positive results (*i.e.* results in agreement with past opinion), recommendations with a generous margin of safety are "justified," and thus the clash with "previous authoritative opinion" is neatly avoided. Would it not have been rather more in keeping with the principles of science to admit plainly that a long-term experiment has disproved earlier results and indications, and that our vitamin biochemists must revise their ideas? Or is it necessary for State-funded research to avoid stating that earlier State-funded research was not quite right?

These remarks must not convey the impression that all went well with the gallant volunteers. If expected symptoms failed to show up, other and individual effects were experienced. Two volunteers developed tuberculosis and two others suffered major illnesses, but it is impossible to assess whether these were consequences of the diet or events that would have occurred in any case. One comment might be ventured. It was by "chemical tests" and "tests with rats" that this otherwise natural diet was found to be consistently low in vitamin A and carotene values. Might it not be the case that these tests are inadequate for measuring these values in foods for humans? If this were the case, then these volunteers might indeed have received much more vitamin A or vitamin precursor material than was supposed.

Monosodium Glutamate

The present considerable interest in monosodium glutamate shown by food manufacturers makes an analysis of its taste timely and useful. This has been done by E. C. Crocker and L. B. Sjöström (*Food Research*, **13**, 6, 450). The authors point out that glutamate has taste but no odour. In this it differs from hydrolysates and meat, the flavour of which is made up of both taste and odour. Their work on meat cooked at low temperature has shown that characteristic and identifying factors in meat flavour are odours and that taste components are mainly sweet and salty. These tastes are common to most cooked foods, but this does not imply that glutamate is capable of producing meat flavour, for which it lacks the most important part, namely, the odour. From their study of monosodium glutamate in a wide variety of foods, the authors conclude that the concept that it is a meat flavour is erroneous and came about from its association with hydrolysate type of impurities capable of contributing meat flavour components. They quote Howe and Barbella (*Food Research*, 1937, **2**, 201), who investigated the role of glutamate, and say: "Several commercial samples of monosodium glutamate used as meat flavouring substitutes have been purified and recrystallised many times. This material has been offered to judges in solutions of high molarity and also in dry form, and meat flavour has not been associated with them. It is our belief that this alleged meat flavour, if present in the original compound, must be due to the impurities present rather than to glutamic acid or its monosodium salt."

The authors have found that the taste of monosodium glutamate is pleasant and is compatible with the flavour of many foods which it enhances or intensifies when used in concentrations at which its own taste is not obvious.

Water Purification Research

A new method of super-chlorination which has led to reduction of the bacterial content of the water supplied to the London area, in a reduction of colour by 23 per cent., and in a complete cessation of complaints of chlorinous tastes is described in a report of the water examination committee of the Metropolitan Water Board which was adopted at its meeting on February 18.

According to the report, a saving on chemicals such as sulphur dioxide, ammonia gas, and ammonium sulphate amounting to £17,888 per annum would be effected by the new process.

So successful has super-chlorination proved that the belief that pre-chlorination of the water could be discontinued without any deterioration in the quality of the finished water was justified. In support of this contention an experiment was devised whereby pre-chlorination was stopped at a works where the quality of the filtered water is particularly dependent upon this process. As a result, the filtered water became extremely bad, containing, on one occasion, 90 *B. coli* per 100 ml., yet the water pumped into supply after treatment by super-chlorination has been of good physical quality and bacteriologically pure.

Some difficulties may be encountered in extreme cold which retards the action of chlorine, but it is anticipated that the provision of contact tanks which are already being constructed at several of the Board's works would enable difficulties such as these to be surmounted.

Pelleted Seed for Sugar

Not only is the work of thinning sugar-beet seedlings a costly operation in terms of labour, but if the process of singling is held up, as much as a ton of crop is lost for each week of delay. Unfortunately sugar-beet seed is very small, making spaced sowing impracticable; though one type of drill often used in this country sows the seed in spaced clusters which eases to some extent the burden of thinning out seedlings. A new approach is being made to this problem in America by the use of pelleted seed, and in the 1948 season 40,000 acres of sugar-beet were sown with this artificially enlarged type of seed.

The material used for coating the seed is able to break up in the soil under conditions which suit germination. It is also claimed that this "jacket" protects the seed from severe weather, thus enabling sowing to be done two or three weeks earlier without risk. However, the several companies producing pelleted seed in America all regard the increased size of the seed as its principal advantage. Fungicidal, insecticidal, and even fertilising materials can be incorporated into the inert coating material, but these are additional refinements and there seems to be some division of opinion as to their value. With sugar-beet seed a dressing of seed fungicide is likely to be as necessary with pelleted seed as with ordinary seed.

This American innovation would seem of considerable interest for our own sugar-beet industry. Its results should certainly be closely watched. Sugar-beet is one of the more expensive farm crops to cultivate and any device that eliminates or greatly reduces the task of singling deserves an exhaustive trial. Pelleted seed certainly costs more than ordinary seed; but it is claimed by the American producers that the saving of seed per acre and the subsequent economy in labour greatly outweigh the extra cost of the seed itself. This, indeed, is a general claim applying to pelleted seeds of many vegetable species such as onions, carrots, cabbages, and lettuce.

High Frequency Cooking Commercialised

That "Radarange" cooking range in production at Waltham, Mass., rouses one or two thoughts on this latest gadget in the Age of Speed. By use of microwaves, on a frequency fixed by the Federal Communications Commission, you may grill half a pound of steak "medium-done" in 40 seconds, a meat patty in two minutes, and a big-size potato in four minutes.

As for America's ubiquitous hamburger, add a dash of mustard and onion, wrap in grease-proof paper, put in a paper bag in the oven, and take out—in 15 seconds, which is less time than required for wrapping.

"Cookery is become an art, a noble science" old Robert Burton wrote long ago. There is no doubt about the "science" now that we have to study the "frequency breakdown" of the molecules of whatever's cooking, with waves passing through oven metal, glass, porcelain and paper bag, all without exciting their molecules as happens with the food contained in them. The blockbuster bomb of the war years was called "a cookie" by the R.A.F., all because the first one sent to Chorley for filling was mistaken for mere utility and set up as a steam-boiler in the kitchen. Since the Air Force men know Radar when they see it, we should appreciate their name for radio-cookers.

But think of possible uses, of the speed with which a chosen dish may be produced at a moment's notice! If you have a distinguished visitor like that eminent musical conductor given local dishes in exchange for encores granted at his concerts, no sooner will the vibrations of the encore be surging through the air than Radar-waves will be turning out Lancashire hot-pot, Cornish pasty, Yorkshire pudding and "parkin," depending on where you are.

Happy Birthday?

The twelfth issue of Ration Books is now being made.

All in the mild autumnal sun
Of nineteen-thirty-nine,
A foundling on the doorstep lay,
It hinted at a six months' stay;
The name it bore was mine!

It brought some funny little bits
Of bacon, sugar, fat;
"Dear, dear!" said I, "and does it think
That this will keep me in the pink?
That I could live on that?"

The creature grew; it brought its kin
In garments green and blue;
Its antics frayed our tempers sore,
Its exigence became a bore,
It gave us sums to do.

While I grow yearly skinnier
The foundling waxes fat.
Each birthday I abuse it
But would I like to lose it?
No! Confound the little brat.

After a long period of research, Fine Industrial Commodities Limited, under the guidance of Mr. Philip S. Powling, managing director, have been instrumental in putting a new British industry on the map. Production of agar in this Acton factory is to be speeded up by the installation of additional plant whereby an annual output of 100 tons of British agar is anticipated in the near future.

Baled and bagged seaweed from Scotland and Ireland.

Britain's New Agar Industry

BEFORE and during the early days of the last war, the company were engaged in a wholesale ice cream business, but in 1941 the Ministry of Health became interested in the prospects of finding alternative supplies of insulin and other glandular drugs. An organisation was formed whereby the low temperature cold room and conservator of the company were made available to receive and freeze the animal glands. A further war-time effort was the starting up of the manufacture of National Rose Hip Syrup in conjunction with an associated concern, Paines and Byrne Limited. The manufacture of this latter product is still being carried on in the factory.

The seaweed is washed in a tank with rotating paddles.

Upon Japan's entry into the war, a serious situation arose, as agar-agar supplies came solely from that country. Scientists working at the Ministry of Health had already foreseen this difficulty, in particular Prof. Lily Newton of Aberystwyth University, who had for many years collated data relating to seaweeds most nearly resembling those used for the production of Japanese agar.

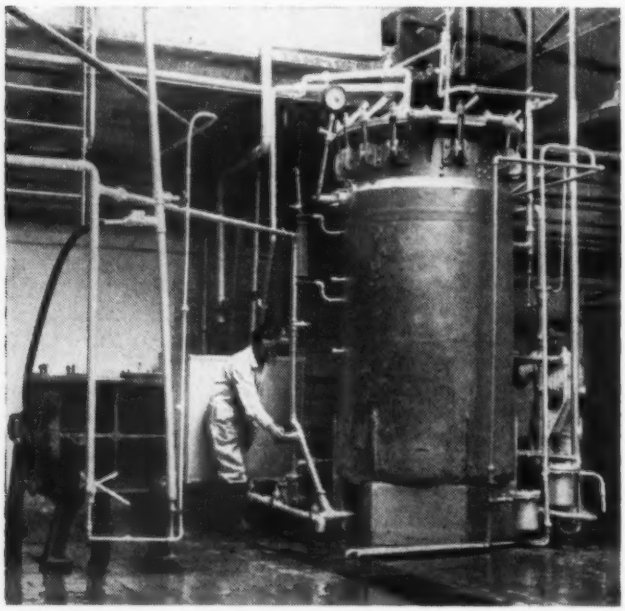
The company, in conjunction with Mr. J. F. Byrne of Paines and Byrne Limited, decided to take a risk and an outlay of £30,000 was made in the installation of plant to carry out the initial

Seaweed undergoing the extraction process.

On emerging from the storage tanks, the liquor is filtered.

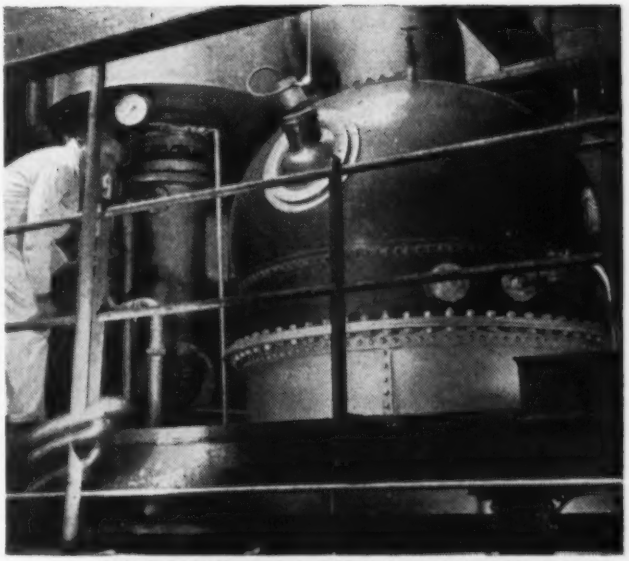
work. In collaboration with Drs. Orr and Marshall of the Scottish Marine Biological Association, Millport, Scotland, the first experiments were confined to producing an agar suitable for bacteriological work, and in this connexion investigations were also checked by some of the leading bacteriologists in the country. The results were at first disappointing as regards consistent manufacture, but the many difficulties were overcome and an excellent product was the outcome.

In order to obtain the high gel strength characteristic of British agar it is subjected during manufacture to certain chemical treatment, which results in a higher mineral fraction in the final product (approximately 30 per cent.) than is present in a typical Japanese agar. Whereas, however, in the latter the ash figure is an index of impurity, the mineral fraction of British agar consists chiefly of potassium chloride together with traces of the radicals calcium, sulphate, and phosphate, and it must be emphasised that these salts are not impurities, but are intentionally added and are indispensable to the gel structure.



The filtered liquor is treated in a transformer.

Ready solubility and greater clarity of the gel (a 2 per cent. gel transmits 70 per cent. of the incident light compared with 30 per cent. transmitted by a similar Japanese agar gel), which is completely free from milkiness and turbidity, are some of the advantages of the British agar. In order to effect solutions it is merely necessary to stir the agar into cold water and then warm to about 80° C. (or 175° F.), when solution occurs readily. It is not necessary to boil, and owing to its freedom from insoluble impurities it is not necessary to filter. Melting temperatures are lower and setting temperatures are higher than those of their Japanese



One of the evaporators, with gallery from which the operator exercises control.

counterpart. In distilled water the approximate melting and setting temperatures are:

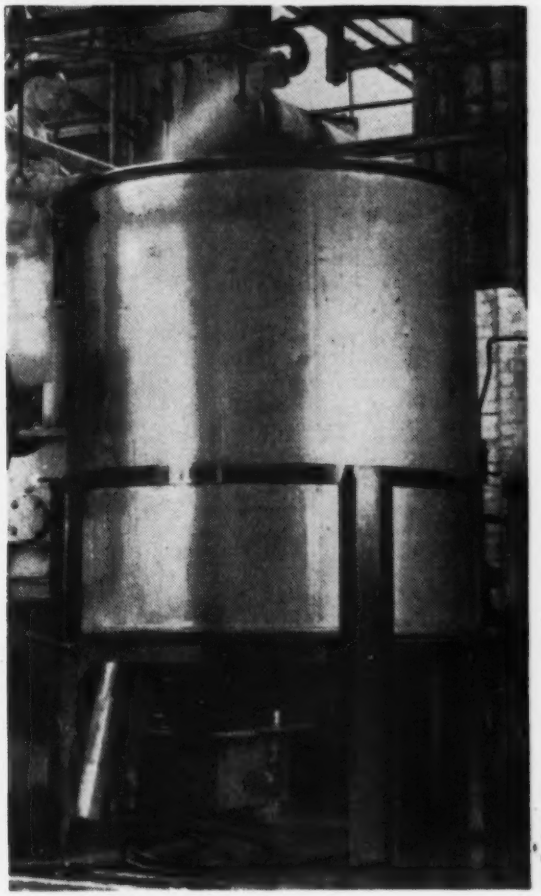
	Melting Point	*Setting Point*
	° C.	° C.
2 per cent. ..	54	38
2½ per cent. ..	57	41
3 per cent. ..	60	43

A certain amount of hydrolysis takes place if kept in contact with acids for any length of time, *e.g.* in confectionery where citric and tartaric acids are used, but this is merely a matter of adjusting the technique to suit the article in which the agar is to be incorporated. A factor which will enable the British product to be used in the manufacture of such commodities as milk jellies and blancmanges is that a gel can be obtained without boiling.

Treating the Seaweed

The type of seaweed used is *Gigartina Stellata* and *Chondrus Crispus*; on collection it is either dried in air or artificially dried, the latter process being increasingly used. The dried weed is sent to

The concentrated liquor is roller dried.



Storage tank for the liquor.

The dried flakes are pulverised and packed for distribution.

the factory, baled or bagged, present stocks amounting to some 150 tons which have come from Scotland and Ireland.

The first step in the treatment of the weed is thorough washing. This is carried out in a tank by means of rotating paddles. The weed is then conveyed by means of hand trucks to the extractor and subjected to an extraction process to obtain an aqueous extract. This is carried out in a specially designed piece of equipment consisting of a perforated drum which rotates in a tank. The weed for extraction is placed in the drum and the requisite amount of water and reagent is added. Steam is then passed through the heating coil to raise the temperature of the liquid in the extractor to boiling point. The liquid boiling up from the coils not only tends to lift the mass of weed away from the perforated walls, but also discharges into the interior of the drum so that the liquid is kept in constant circulation and the weed in constant agitation.

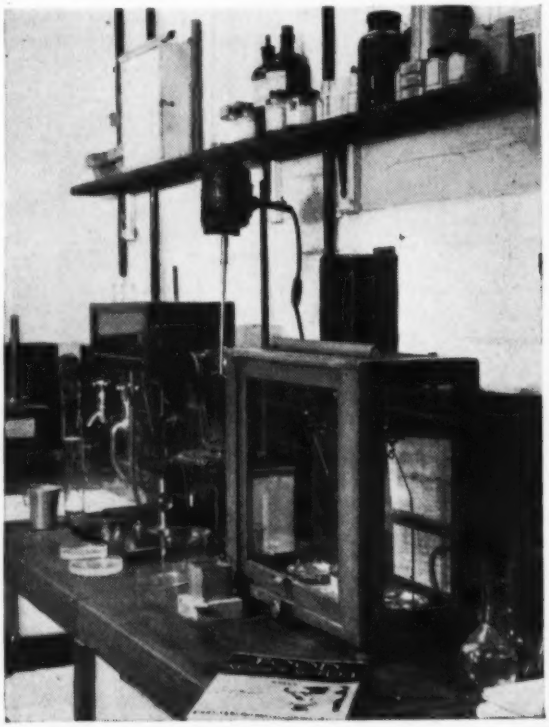
A pump for the extraction of the liquor is connected to the bottom of the tank and a check valve is interposed between the tank and the pump in order to regulate the speed at which the pump can extract the liquid contents of the tank after the completion of the extraction process. This is of importance since too rapid pumping tends to suck the gelatinous mass into the perforations of the drum which would arrest the removal of the liquid to the storage tank. The pressed residues are run into drums and used as a constituent for fertiliser.

The filtered liquor is next treated in a transformer in which, under heat and pressure, the extract is converted into an agar. From the transformer, the liquor is decolorised and filtered, followed by concentration under vacuum. The concentrated liquor is then roller dried. For this part of the process special American machines with chromium-plated rollers have been installed. The dried flakes are then pulverised and the finished product is packed for distribution.

The present output of 1,600 lb. per week is to be trebled following the installation of the new plant and machinery. Not only will the product be available in powder form, but it will compare favourably in price with the Japanese agar.

SUPPLIERS OF EQUIPMENT

Filter press: *S. H. Johnson and Co., Ltd.*
High pressure steam plant: *Alley and Maclellan.*
Evaporator: *George Scott and Son (London), Ltd.*
Pumps: *Mono Pumps, Ltd, Pulsometer Engineering Co., Ltd.*, and *Worthington-Simpson, Ltd.*
Water softening plant: *Permutit Co., Ltd.*
Storage tanks: *Metal Propellers, Ltd.*, and *A. Johnson and Co. (London), Ltd.*
Double drum drier: *Blaw Knox Co., N.Y.*
Refrigerating plant: *L. Sterne and Co., Ltd.*
Ducting and conveyors: *Willard Engineering Co.*



A corner of the laboratory.

The Curing of Bacon with Acid Brines

Part I

M. INGRAM, M.A., Ph.D.

Low Temperature Station for Research in Biochemistry and Biophysics, University of Cambridge, and Department of Scientific and Industrial Research.

Putrefying bacteria do not survive in an acid environment[1] and the curing of meat in acid solutions thus offers the prospect of a product with enhanced resistance to bacterial spoilage. This article describes a series of experiments in which pork was cured with pickle of *p*H about 4·5 and discusses the results obtained.

THE addition of acid to brines used in the curing of fish[2] has been tried, the acids used being lactic, tartaric, citric, formic, and hydrochloric. Lactic acid has been regarded as the most suitable for use with meat since it is normally present in dead muscle, and patents cover the addition of this acid to bacon-curing pickles.[3]

Consideration suggests, however, that it would be difficult, in this way, to maintain the acidity and yet keep up the cycle of operations which is normally carried out with a bacon-curing pickle. This cycle is necessary because the addition of the meat changes the composition of the solution. The meat takes up salts and gives out water, and so becomes partly cured; in consequence, the pickle is diluted, and before more meat can be introduced, its composition must be restored. Appropriate salts are dissolved, the pickle is filtered, and it can then be used again. Under favourable circumstances this process is repeated indefinitely. If acid is used, it too must be added after each pickling operation, to restore the original acidity of the solution. When meat is added to pickle previously adjusted to a given *p*H with an acid HX, part of the H° ions in the pickle will combine with protein anions in the meat, leaving most of the anions X′ in the solution. The upshot of the exchange of H° ions is that the meat becomes more acid (the result desired), and the solution less so. Therefore, before the pickle can be used again, more acid must be added, when a proportion of the X′ ions will again remain in the pickling solution. Thus repeated additions of acid and meat bring about a gradual accumulation of X′ ions in the pickle, which should also lead to a gradually rising concentration in the meat.

Accumulation of Anions

This accumulation of anions might have two deleterious effects. In the first place, unusual flavours may be imparted to the meat. Secondly, if HX is a weak acid, the presence of the anions X′ will increase the buffering power of the pickle. The magnitude of the buffering action of the X′ ions depends on the dissociation constant of the acid HX and the range of *p*H involved. Roughly,

$$pH = pK + \log \frac{(X')}{(HX)}$$

and the system $(HX + H^\circ + X')$ exerts its greatest buffering power when $(X') = (HX)$, which is, therefore, when $pH = pK$.[4] To obtain reasonable freedom from bacterial spoilage, the meat must not be much less acid than *p*H 5[1]; so that the pickle must be more acid than this, say *p*H 4 or 4·5 The acids apparently the most likely to be useful, *e.g.* lactic, acetic, or citric, have *p*K values 3·9, 4·7, and 3·0-4 and 4-5·5 (dissociation of first and second H° ions) respectively. It is clear that the accumulation of lactate, acetate, or citrate ions in a solution of *p*H 4-4·5 will result in a powerful buffering action. Hence, if one of these acids has been used in the pickling solution, the buffering power of the latter should be appreciably increased, and after the meat is removed, more acid than before should be necessary, to restore the initial *p*H of the solution. The addition of this extra acid HX introduces still more X′, further increasing the buffering power, so the process is rapidly cumulative, and one would expect that large amounts of acid might become necessary after a few operations.

Use of Hydrochloric or Nitric Acids

In contrast, mineral acids such as HCl are very highly dissociated, and their anions exert negligible buffering power in the *p*H range 4-5. It seemed probable, therefore, that hydrochloric or nitric acids might lend themselves to use in a cycle of pickling operations far better than those previously suggested, for these reasons:

(i) The presence of the anions Cl' or NO_3' would not result in buffering action, so that the amount of acid needed to restore the *p*H should remain constant over a series of curing cycles.

(ii) Any tendency of the anions to accumulate in the pickle could be compensated by regulating the amount of NaCl (or KNO_3) added after each cycle.

(iii) As each of these anions is already present in considerable concentration, the addition of small quantities as acid would be unlikely to introduce any new flavours.

The experiments described below were carried

out to test the correctness of the foregoing suppositions, by comparing the effects of acetic and hydrochloric acids, when they were added over and over again to pickling solutions, used in a repeated cycle of operations, and kept to a constant *p*H.

Small pieces of pork were immersed in brines at *p*H 4·5, and after use the brines were brought back to *p*H 4·5 by the addition of the appropriate acid and salt was added to maintain the salt-concentration. This process was repeated twelve times. In order to permit of accurate comparison of materials cured in the two brines, paired fillets (left and right *psoas major* muscles) were used, one being pickled in each brine. Three pairs of fillets were used for each cycle. For purposes of reference, the fillets are designated 1-3A, 1-3B (first curing cycle); 4-6A, 4-6B (second curing cycle), etc., where A indicates those pickled in brine with acetic acid, and B those with hydrochloric acid. There was a close correlation between the average *p*Hs of these opposed groups of three fillets (Fig. 1).

Retaining Uniformity of Fillets

To ensure that the fillets were as uniform as possible before pickling, they were chilled for twelve hours, then frozen at −10° C., and thawed before use. It has been shown that freezing and thawing tend to result in greater uniformity and openness of structure and a more rapid penetration of salts.[5] It would seem that some systematic change took place during storage, for the fillets were more alkaline the longer they had been stored. This is shown in Fig. 1 and Table III, where the *p*H values are those obtained after mincing about 10 g. from the thin end of the fillet.

The fillets were weighed both before and after pickling.

Treatment of Brine

The initial composition of the pickles was 25 per cent. sodium chloride + 2·5 per cent. potassium nitrate + 0·025 per cent. potassium nitrite; with a *p*H of 4·5 obtained by the addition of the appropriate acid, and a total volume of 1,500 c.c.

After pickling, the fillets were allowed to drain into the solution for ten minutes, and the total volume of the pickle was then estimated; after which a measured sample was removed and the chloride concentration rapidly determined. Further measured samples were removed for other determinations. The *p*H of each brine was then observed and restored to *p*H 4·5 by the addition of a recorded amount of acid, the process being controlled by means of a glass electrode. The remaining known volume was then made up to 1,500 c.c. and 25 per cent. sodium chloride,* but the nitrate and nitrite were not adjusted. The pickles were then ready for use again.

Treatment of Pickled Meat

The two groups, of three fillets each, were pickled for one hour at 18° C. The fillets were completely immersed and the pickle was not stirred. It was calculated that this short curing time would compensate for the large surface/volume ratio of the fillets; the final salt-contents attained were, in fact, normal for lean bacon.

After the fillets had been drained and weighed, a sample was taken from the centre of each for tasting. The remainder was then minced.

A sample of this mince was removed for the determination of the *p*H after pickling. This value is, unfortunately, not necessarily ident-

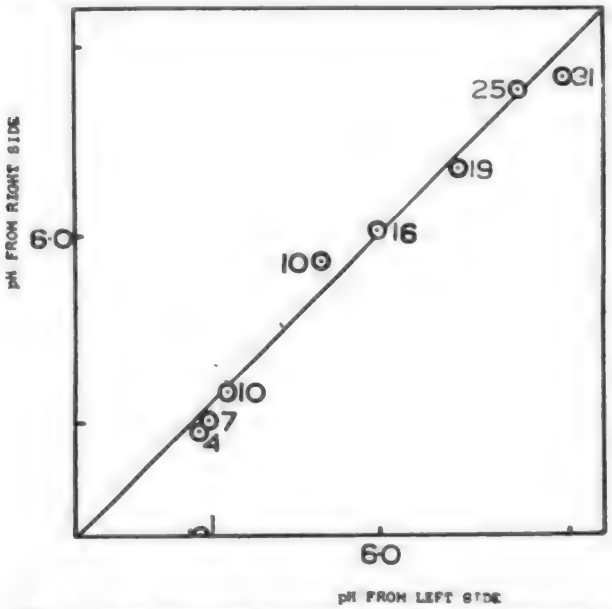


Fig. 1.—Close correlation between pHs of opposite members of pairs of "psoas major" muscles from the same animal. (Points 1-16 represent averages of groups of 3 pairs, 19-31 of groups of 6 pairs.)

* It was necessary to make these adjustments at this stage in order to take account of all the previous changes of volume. These points should be noted:

(i) Since the NaCl to be added was calculated from a determination of chloride made before the acids were added, it neglects any Cl′ added as HCl during the restitution of the *p*H, but this was always less than 0·1 per cent. of that already present as NaCl.

(ii) The addition of NaCl disturbed the *p*H slightly in an acid direction after it had been adjusted. This shift of *p*H was never more than −0·02, and has been neglected.

(iii) The measurements of the viscosity of the pickles were not always made at exactly the same concentration of NaCl, as there were variations in the concentration of salt remaining after pickling: but these variations were slight compared with the total concentration of NaCl. (Compare Table II.)

TABLE I

DIFFERENCES BETWEEN PICKLES CONTAINING (A) ACETIC AND (B) HYDROCHLORIC ACIDS

No. of Pairs of Fillets.	*c.c. N Acid to restore pH 4·5.*		*Buffer Capacity c.c. N Acid / pH Unit.*		*pH after Pickling.*		*Na Acetate Flavour (Av. out of 2).*	
	(*A*)	(*B*)	(*A*)	(*B*)	(*A*)	(*B*)	(*A*)	(*B*)
1-3	9·1	4·8	8·2	5·5	5·60	5·35	0·17	0·00
4-6	2·0	1·7	10·0	8·5	4·70	4·70	0·33	0·29
7-9	7·2	2·7	22·0	8·5	4·82	4·82	0·33	0·17
10-12	1·6	0·7	16·0	9·0	4·60	4·60	0·12	0·25
13-15	3·7	1·8	2·7	7·5	4·64	4·74	0·28	0·08
16-18	3·7	2·8	2·5	9·0	4·70	4·82	0·12	0·04
19-21	3·7	2·0	2·3	8·5	4·66	4·74	0·29	0·17
22-24	4·6	2·9	27·0	12·0	4·67	4·74	0·50	0·12
25-27	10·5	3·9	75·0	14·0	4·64	4·78	0·33	0·25
28-30	8·5	5·3	700·0	14·0	4·62	4·87	0·12	0·00
31-33	10·5	4·4	1,000·0	18·0	4·60	4·75	0·00	0·33
34-36	15·0	4·0	1,700·0	17·0	4·59	4·74	0·33	0·00

ical with the initial *p*H as determined on a part only of the fillet, for experiments with other material have shown that minor differences in *p*H may exist between different parts of the same fillet.

After the *p*H samples had been removed, the remaining minced meat was mixed in the two appropriate groups of three samples, and the samples of the mixture removed for analysis were stored at −10° C. in closed jars.

In the analysis of meat samples the *p*Hs were measured without delay with a glass electrode after mincing and stirring with an equal volume of distilled water. For the other analyses, the mixed samples of mince were extracted three times, on each occasion with 10 volumes of hot water, and analyses were made upon these aqueous extracts as upon the pickling solutions.

In the case of the pickling solutions, chloride was estimated by electrometric titration.[6] Nitrate was estimated polarographically.[7] These methods had the advantage that it was unnecessary to remove protein beforehand. Nitrite was estimated by the colorimetric method of Auerbach and Reiss,[8] modified by the addition of excess of chloride to the standard solutions to compensate for colour variations due to the chloride content of the unknowns. No satisfactory procedure was discovered for estimating the small concentrations of acetate in our brines in the presence of the great excess of chloride. The relative viscosity was measured (Ostwald pipette) as a rough guide to protein content.

Tasting Tests

The samples removed for tasting were matured on waxed boards at 95 per cent. relative humidity and 5° C. for fourteen days, as in normal curing practice (but this could not be expected to reproduce normal conditions because of scale effects). They were then stored until needed at −5° C. (*i.e.* just above their freezing point). The samples were randomised, and each was fried in fresh lard for a standard time in a gas griller before being submitted under code for tasting.

They were presented to a panel of four tasters experienced in tasting pork products under experimental conditions. In advance these tasters had been trained to recognise the flavours of hydrochloric and acetic acids and the sweetish flavour of sodium acetate (sodium being much the most abundant cation in the brines).

Members of the panel were required to take note

TABLE II

PROPERTIES SHOWING NO SIGNIFICANT CHANGE WITH PROGRESS OF THE EXPERIMENT: (A) ACETIC, (B) HYDROCHLORIC PICKLE

No. of Pairs of Fillets.	*Per Cent. NaCl after Pickling.*		*Pickle g. NaCl to Restore to 25 Per Cent.*		= *Relative Viscosity.*		*Matured Meat.* *Acid Flavour Score (Av. out of 2).*		*Foreign Flavour Score (Av. out of 3).*	
	(*A*)	(*B*)	(*A*)	(*B*)	(*A*)	(*B*)	(*A*)	(*B*)	(*A*)	(*B*)
1-3	24·2	24·2	12	12	67	66	0·12	0·03	1·2	1·4
4-6	22·7	23·0	35	30	63	63	0·09	0·16	0·8	1·0
7-9	21·4	22·4	54	42	—	—	0·00	0·10	0·7	0·3
10-12	23·5	22·7	22	34	66	68	0·25	0·00	0·6	0·8
13-15	23·2	23·2	45	41	67	65	0·00	0·25	0·7	0·5
16-18	24·0	23·6	29	34	70	70	0·06	0·12	0·4	0·7
19-21	23·6	23·9	33	29	72	70	0·12	0·15	0·9	0·5
22-24	24·3	23·7	35	55	70	70	0·00	0·12	0·8	0·7
25-27	23·1	23·7	43	32	—	—	0·03	0·03	0·2	0·4
28-30	24·2	23·8	39	30	63	65	0·00	0·12	0·5	0·5
31-33	22·5	24·3	54	27	—	—	0·10	0·12	0·6	1·0
34-36	23·5	23·4	—	—	64	62	0·10	0·06	0·4	0·8

TABLE III

PROPERTIES SHOWING SYSTEMATIC CHANGE WITH PROGRESS OF EXPERIMENT: (A) ACETIC, (B) HYDROCHLORIC PICKLE

Numbering of Fillets.			*1-3*	*4-6*	*7-9*	*10-12*	*13-15*	*16-18*	*19-21*	*22-24*	*25-27*	*28-30*	*31-33*	*34-36*
pH of fillets: before curing	(A)	5.95	5.30	5.48	5.57	5.58	5.51	6.00	6.11	6.22	6.35	6.42	6.31	6.51
	(B)	5.99	5.52	5.53	5.58	5.60	5.55	6.01	6.34	6.09	6.33	6.42	6.42	6.56
after curing	(A)	5.68	5.34	5.34	5.43	5.51	5.44	6.11	5.93	5.65	6.05	5.81	5.67	5.84
	(B)	5.72	5.44	5.34	5.40	5.57	5.45	6.04	5.85	5.61	5.91	6.19	5.92	5.97
Molar concentration of nitrate: before pickling	(A)		0.24	0.225	0.186	0.175	—	0.168	—	—	0.134	—	—	0.105
	(B)		0.24	0.225	0.201	0.190	—	0.165	—	—	0.130	—	—	0.112
Concentration nitrite (p.p.m. KNO_2)	(A)		250.0	55.0	—	—	12.0	—	—	—	5.0	—	—	< 5.0
	(B)		250.0	50.0	—	—	15.0	—	—	—	5.0	—	—	< 5.0
Per cent. gain wt. of fillet	(A)		6.4	4.9	5.2	2.3	4.3	1.9	1.3	1.0	2.3	2.0	1.8	0.0
	(B)		5.5	6.9	2.6	1.9	—	2.6	2.6	1.0	1.8	1.8	1.3	0.3
Salt content of fillet (%)	(A)		4.43	4.71	2.86	3.99	4.77	3.87	3.79		3.58		3.46	
	(B)		4.69	5.13	3.06	3.50	4.37	4.29	3.20		3.73		3.49	
Mark for salty flavour (av. out of 4)	(A)		2.1	2.0	1.0	1.3	1.4	0.8	1.2	1.5	1.1	0.8	1.1	0.8
	(B)		2.7	2.0	1.1	1.0	1.1	1.2	0.8	0.9	1.3	0.6	1.3	0.7
Ratio salty flavour score: % salt	(A)		0.47	0.42	0.35	0.33	0.29	0.21	0.33		0.27		0.29	
	(B)		0.58	0.39	0.36	0.29	0.25	0.28	0.22		0.25		0.29	
Frequency of flavour comments (− = "porky"; + = "cured")	(A)		−2	−1	−2	−1	−2	−3	−1	−2	0	+2	−1	+3
	(B)		−5	−2	−1+1	−1	−2	−1	−2	−3	+1	0	−2	−2+2

of the following characters of the meat and to award scores as indicated:

(i) Red colour, due to nitrosohaemoglobin, characteristic of cured meat:

Full red colour like mature bacon .. 5, down to
Pale grey colour like uncured pork .. 0

(ii) Texture of meat:

Tender and juicy	5
Tender	4
Fairly tender	3
Fairly tough	2
Tough	1
Very tough	0

(iii) Salty taste according to the scale:

Very salty	4
Salty	3
Slightly salty	2
Just perceptibly salty	1
Absent	0

(iv) Acid flavour:

Obvious	2
Perceptible	1
Absent	0

(v) Sodium acetate flavour on the same scale as (iv).

(vi) The panel was also asked to comment on the flavour due to the meat itself, whether porky or well cured, and to describe foreign flavours and to record on the scale.

Strong	3
Moderate	2
Perceptible	1
Absent	0

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(To be continued)

Preserving Fruit Flavour

APPLE ice cream and many other new apple products may be prepared by a process for preserving the fresh-fruit flavour in apple juice and jelly according to a report presented at a recent meeting of the American Chemical Society by Dr. R. P. Homiller, chemical engineer of the Eastern Regional Research Laboratory of the Department of Agriculture.

A method has now been developed by which the commercial processor can recover the volatile substances which are lost in commercially packed jellies and juices during processing, and put them back into his products, thus completely restoring the original desirable fresh apple flavour.

Other uses for this full flavour concentrate have been suggested, *e.g.* in the manufacture of fountain syrups, bakery products, ice cream, and canned fruits. Grape juice and the juices of various other fruits and berries can be treated by a similar but modified process, and investigations along these lines are being carried out.

These methods of harvesting have been largely supplanted in Canada by the combine harvester.
Courtesy National Film Board, Canada.

World Cereals Today

Cereals in a varying degree affect the life of practically everyone in the world. They bear on the economics and politics of nations, and indeed play no small part in shaping the very course of history. The use of such cereals as wheat, maize, barley, oats, rye, and rice is described and methods are outlined for the restoration of the system of free markets as a means of effecting the best and most efficient distribution of cereals throughout the world.

APART from the isolated carnivorous races, cereals universally provide man and his livestock with the bulk of their food. Climatic and geological considerations, together with economic factors, have largely determined which particular cereal should be grown in the various countries, but custom, too, has played its part, particularly with semi-civilised communities.

Each cereal has its own particular strength and weakness. Wheat is in a category of its own. Its peculiar protein properties make it ideal for bread making, and as a result it has become the most important bread grain in the world, both as regards human nutrition and as regards choice.

There are many varieties of wheat, all differing in their characteristics according to the climate and soil conditions under which they are grown. Under normal conditions before the war, it was possible for the miller in the U.K. to select and purchase his wheat from any part of the world, an important condition being that he had to ensure that his flours were of regular quality despite the diversity of the wheat used in his mixture.

Much home-grown wheat gives a load-extension curve of dough which reflects poor bread-making quality, although some varieties, such as Holdfast, which is a comparatively recent production, will give good quality bread when used alone.

A strong Canadian wheat gives a big curve showing marked extensibility, while some wheats grown in hot countries give doughs which are brittle and have low extensibility.

By skilful blending of wheats having different characteristics the miller goes a long way towards producing the ideal flour. It is not generally possible, however, to reach this ideal by blending alone, and the miller treats his wheats or flour by physical and/or chemical means, so that the character of the dough made from it is suitably modified. In this way, by skilful choice of wheats and the correct treatment, he can produce a flour having the desired characteristics.

Nutritionally, in a balanced diet oats rank high, since they have an excellent fat content and a high proportion of protein. Apart from porridge and biscuits, oats are used mostly for animal feeding purposes, in this country at all events.

Uses of Barley

Barley was probably the first cereal cultivated by man—the earliest example being estimated somewhere at about 6,000 B.C. It is found in practically every country in the world. Barley was no doubt used in the first place as human food, being made into a sort of bread, but its gluten lacks the elasticity of wheat gluten. It is used for the malting of beer, for distilling, and for "pearling." It also

Grain not used immediately on the farms is stored in the American Government's granary bins, which serve to provide an even supply of grain for good years and bad.

forms a highly nutritious animal food, for which purpose it is used extensively.

Rye is a crop grown mainly where poor soils prevail. In some parts of Europe it is the main crop —in fact, a very high proportion of the world's rye crop is produced in European countries; as a result, rye bread is the staple food in some parts of Europe. It is eaten mainly in Germany, Scandinavia, Austria, and in parts of Russia. In these countries wheaten bread is regarded more or less as a luxury, and its consumption is confined to the wealthier classes, or to special occasions. For this reason rye is sometimes referred to as the "bread grain of poverty." As a matter of fact, although there are marked differences displayed in respect of colour and flavour, rye is akin to wheat in its chemical composition, and rye bread possesses practically the same nutritional value as wheaten bread. The major use of rye has always been for bread making, but substantial quantities are used for livestock feeding in certain European countries. Even so in these countries far smaller quantities of rye are fed to livestock than of maize, oats, and barley. Generally, the taste of rye is not relished by livestock, and it has to be fed with considerable care, since it causes digestive trouble when forming more than 50 per cent. of the livestock grain ration. The quantities of rye used for industrial purposes—mainly rye whisky—are small in all countries.

Rice and Maize

Rice has been known to man from early days, and is known to have been grown as early as 2,000 B.C. Rice requires much sunshine and moisture, and it is the staple cereal for most Eastern nations. Rice milling by-products (*i.e.* rice bran from the milling of husked rice) are used for animal feeding, but owing to their high fat content are not easily stored and tend to turn rancid. Rice is also used for brewing, especially in Japan.

The origin of maize is still unknown, and this cereal has never been found in its wild state. It is a plant which from the earliest times has been dependent on man for its existence. Judged purely from a nutritional standpoint, maize ranks low in cereal hierarchy, and its geographical distribution is associated with that of endemic pellagra. For animal feeding purposes it is held in high esteem, and it is both cheap and easy to produce. Maize is also used for brewing native beers and is so used in Africa. Its industrial uses are manifold.

Wheat-producing Countries

The U.S.A. has increased its wheat production very much as compared with the average of 1935/1939, although the acreage sown is very little changed. The increased yields were very largely due to good weather in the years 1946 and 1947 and the increased use of fertilisers in the Western States.

The fact that sometimes the smaller acreage gives a very much larger production is one of the facts which make long-term planning by acreage so unsatisfactory and indeed useless. Too rigid a system of planning might very easily lead to widespread famine and disaster.

Wheat is being sown and harvested all over the world every month of the year, and it was the old pre-war system of a free market which enabled quick adjustments in price to be made, which, with this universal growing of wheat, changed the supply position in a very short time.

The greatest wheat-producing countries are Russia, the U.S.A., and China, but China's wheat, like other crops of which she is a large producer, is all required for feeding her own vast population. The series of bumper crops which have been harvested in the U.S.A. since the second world war have made that country for several years by far the greatest exporter of wheat. It is unlikely, however,

that this role will be maintained indefinitely, and as the demand by importing countries falls, there is likely to be a reduction in the area sown to wheat in the U.S.A. until exports are brought nearer to their pre-war size.

The U.S.A., with the somewhat reduced acreage of 1947, had still a slightly larger crop than it had for the average of 1935/1939, whereas in 1946 the production was a bumper crop, due to the increased use of fertilisers and favourable weather.

Production Data

All data of production are based on the sales from the farms, and it should be pointed out that there may be some error in this method, due to different methods of harvesting: for instance, in the U.K. the introduction of combine harvesting has meant an increased weight of wheat from the farms, although in many cases the nutrient value is lower. If crops were shown on a "dry matter" basis, there might be as much as 4 per cent. difference, due either to combine harvesting, which means a higher moisture content in the grain, or in the reverse, to drying on the farm, which leads to a lower moisture content and lower production.

Owing to the dislocation of the war years and post-war years, it has not been possible to secure the latest figures of rice acreage and production. It can be said, however, that this year there has been a marked improvement in the world rice production, and the acreage of rice land planted and harvested in the 1947/1948 season is estimated to be larger than pre-war. The total crop was slightly less than in the average year immediately before the war, and the situation of those countries which rely on rice as their basic element is still extremely difficult.

The return to pre-war levels of production in the world as a whole has not meant a return to pre-war standards of consumption in these particular countries. This is partly due to the large increase in population that has occurred throughout Asia in the last ten years.

Another and equally important factor is that although total world production is almost back to pre-war, the geographical distribution of the output is very different. The three major exporting countries, Burma, Siam, and Indo-China, are still producing far less than before the war. The main deficit countries are India, Malaya, China, and Ceylon in that order.

Figures available show that the United States is far and away the biggest producer of rice, and before the war Germany came second, closely followed by Canada and France. Russia has been reported to be slightly ahead, but the figures are only estimated.

In 1946, the Chinese barley crop was estimated at 39,200,000 quarters, no later figures being available. The Russian crop was estimated slightly higher at 44,800,000 quarters for the same year. After these two countries the next biggest producer is the U.S.A. followed by Canada and what was then British India. Previous to the war Germany produced a large crop of barley, but no figures are available to show how the acreage has been restored since the war.

In 1946, the Russian crop of rye was estimated at 74,660,000 quarters, being by far the largest production of any country. Before the war Germany and Poland were also very large producers, but once again it is impossible to say to what extent the pre-war position has been restored.

Position of World Cereals

From the foregoing it will be seen that wheat leads the cereal world, with maize a close second. As wheaten bread becomes more popular throughout the world (and a definite shift in consumption from other grains to wheat is observed in South America and in parts of Asia) so this gap must be expected to widen. Rice is third, but it must not be forgotten that rice has only been ousted tempor-

Experiments have shown that locally adapted hybrid varieties of corn yield more than old open pollinated strains.

A Canadian farmer tests wheat crop for ripeness.
Courtesy National Film Board, Canada.

arily from second place owing to the unsettled conditions in the Far East. Rice still remains the staple food for nearly half the human race.

These three cereals, then, wheat, maize, and rice, are far ahead of all others, which however are themselves produced in enormous quantities. Fourth is oats, well ahead of barley, and just below barley is rye.

Inequality of Production

A consideration of the figures for the production of cereals per head of population in their countries of origin in 1947 shows the inequality in the production of cereals throughout the world. They show clearly those countries with a surplus, and those countries which for some reason or other—whether as a result of a high industrial population (as in the United Kingdom) or whether as a result of archaic methods of agriculture (as in some Eastern countries)—are nowhere near self-sufficiency in cereal production.

It is interesting to see that the United Kingdom is at the bottom of the list, due to its high industrial population. During the war a considerable increase was made in home production, and even before the war the introduction of the Wheat Act gave an incentive to farmers in connexion with the production of wheat whereby during the years between 1932 and 1939 the acreage increased very considerably.

The Wheat Act

The Wheat Act gave the wheat grower a secure market and ensured an enhanced price, but the flour milling industry continued to buy in an economic and efficient manner at the lowest price possible to the direct benefit of all consumers. Premiums on quality were still possible, and growers got the advantage of these instead of as at present when all wheat is sold at a fixed price and quality means nothing to the farmer in so far as his actual financial return is concerned. The farmer, under the Wheat Act, got his additional remuneration by means of deficiency payments, and when these were high the cost of flour to the consumer was low. This position arose from a decline in the world value of wheat. The Wheat Act was an ingenious scheme, and it worked before the war to the satisfaction not only of the farmer and the grain trade interests, but also was equitable to the consumer.

International Grain Trade

Before the war by far the greater proportion of cereals stayed in the countries of origin for consumption there, and the quantities going into international trade channels were a small percentage of the whole. Nevertheless, huge quantities were transported and marketed every year. In the main, these cereals were marketed through the medium of the international grain trade, using the machinery of the grain markets, of which an excellent example was Liverpool. All types of grain were kept moving freely from those countries with a surplus to those countries requiring them. It should be emphasised that the grain was at all times bought and sold in a free market—that is, according to the principles of supply and demand—and naturally quality was always a most important factor. Price movements upwards gave an incentive to greater production or, if in a downward direction, sowings were retarded in accordance with requirements, and these price movements had almost immediate effect in some parts of the world. This somewhat delicate machinery worked well before the war, and it is difficult to see anything in the plans which have been made today by various experts which would produce as good a result, nor as safe a position as regards supply, as obtained under the grain trade's operations before the war.

The United Kingdom is the greatest importer of wheat in the world. Under normal conditions the United Kingdom cannot be self-sufficient in wheat

supplies, and there is moreover the requirement that in order to produce good bread-making flour, "strong" imported wheats have to be blended with our softer native wheats in suitable proportions. Under the conditions of a free market before the war, wheat flowed freely into the United Kingdom from up to forty different countries, following no rigid pattern, but at all times satisfying the qualitative and quantitative requirements of the British miller. As a result of all this, we enjoyed a loaf in this country of excellent quality, comparing favourably in price with any country in the world, not excluding the great wheat exporting countries themselves.

The variegated pattern of our wheat supplies before the war, made up of the different exporting countries as and when supplies were available, has been replaced by the rigid, almost single track, pattern of 1940 and thereafter. Recently our suppliers have been limited to Canada, the U.S.A., Australia, and the Argentine.

Bulk Buying

At the outbreak of war, responsibility for the purchase of wheat was assumed, quite rightly, by the Government, but it has remained in Government hands ever since. The system of bulk buying, with its long term and bilateral agreements, etc., has replaced the system of the free market which was in being before the war. Under this present system, contracts are usually based on long term agreements, and seasonal fluctuations in price, which are frequently to the buyers' advantage, no longer benefit us. Prices are very often struck without any logical basis. Sometimes they are fantastically high, and often extremely large profits have been taken by overseas governments—examples of this being Argentina and Australia, where one price was fixed for the purchasing government and a second and much reduced price was paid to the actual producer.

From a close study of this system of bulk purchases by government, coupled with long term agreements, seldom has it been possible to offer the right price in the right market at the right time, and the only conclusion which can be reached from a study of these methods is that bulk buying is quite unsuited to normal competitive conditions and should, as early as possible, be replaced by the normal operations of the grain trade on similar lines to those carried on before the war.

Future Prospects

It will require a very bold man to attempt to forecast the future in the cereal world. History has recorded many instances of attempts which have proved disastrous. It must be obvious to everyone that production of cereals must be advanced by every means at man's disposal. Despite the recent bumper crops in the U.S.A. and Canada, many people are still going hungry somewhere or other in the world, and even in this country we cannot claim to have been excessively well fed. The increase in world population, despite the heavy toll of war, is something which must be faced—the net increase between July, 1938, and July, 1946, was 123 million or a 5 per cent. increase—Asia (excluding the U.S.S.R.) accounting for the largest increase. Increased and intensive cereal production is therefore required, and this means that such obstacles as critical shortages of fertilisers, farming machinery, power, good seed, etc., must be made good possibly by international co-operation and action by all nations of goodwill.

Restoration of Free Markets

Now, despite the dismal forecasts made regularly by certain eminent authorities, there is no reason why these various requirements cannot be met, even though in some cases progress must be slower than is desirable. The increased cereal production required can and will be achieved. Assuming that this can and will be done, more than ever we shall require the restoration of the system of free markets to effect the best and most efficient distribution of cereals throughout the world. Basically, it is confidence that is required. The example of the U.S.A. should be closely studied. In that country they have created a market acceptable to both purchasers and consumers, so that constantly changing emphasis can be given to the movement and con-

(*Continued on page* 210)

Corn husked for a yield test in Grundy County, Iowa.

Controlling Apple Juice Quality

In a paper read at the symposium on food quality and control held by the Division of Agricultural and Food Chemistry of the American Chemical Society, Roy E. Marshall, of Michigan State College, said that the most important factor in determining the quality of apple juice was the quality of the raw product. This implied the proper blending of several varieties of apples that were well matured and properly ripened to provide a Brix reading of not less than 12·5, a malic acid content of 0·4 to 0·65, and a typical apple flavour.

Clarification played no important role in determining the flavour quality of the final product, and for the maintenance of the shelf-life of the juice it was found that partial deaeration and fortification with ascorbic acid were beneficial.

Holding pasteurisation resulted in an unpalatable juice; hence flash pasteurisation was essential to provide marketable quality. This treatment, at maximum temperatures of 165° F. to 175° F., provided juice of a better quality than temperatures of 180° F. to 190° F. Head space in the container should be the minimum attainable at the former filling temperatures consistent with commercial practice.

Prompt cooling of filled and closed containers to less than 100° F. was just as important as pasteurising temperatures in attaining quality.

Pointers to Colonial Prosperity

Recommendations for increasing Colonial production of vegetable oils and oilseeds, starch, fish and marine products, essential oils, timber, paper pulp, tanning materials, and tobacco are contained in a report* which shows, commodity by commodity, what the world and sterling demand is and is likely to be, and in the light of this demand whether Colonial production of certain commodites should be expanded or discouraged.

Oilseeds and Vegetable Oils

Although the dislocation of war years has been overcome, supplies of oils and fats available to countries in the soft currency areas are much less than their requirements. Maintenance of the post-war recovery will depend largely on maintenance of the exports of consumer goods which Britain is able to send to raise the standard of living in the Colonies.

This applies particularly to the output from West Africa of palm oil products, which depends on the availability of labour and the inclination of the Africans to collect and process the fruit of wild palms.

This year the functions of the West African Produce Control Board, which His Majesty's Government established during the war to buy through merchants and export all important oils and oilseeds, will pass to marketing boards in the territories, in which producers' representatives will take an active part.

New Oilseeds Boards will use the accumulated funds of the West African Produce Control Board which are to be made over to them for the benefit of the industry, particularly in protecting producers from fluctuation in world prices.

It is estimated that there are 500,000 acres in Malaya suitable for the growing of palm oil. This commodity is now mainly produced on plantations with factories at hand. It is thought that it might also be produced on small holdings, possibly by the use of oil palms, as in the Belgian Congo, as shade for cocoa.

Starch and Essential Oils

Hitherto the monopoly of St. Vincent in the West Indies, arrowroot is to be tried as a crop in Grenada.

Sago from Sarawak—source of starch for textiles—mounted from the 1937 export figure of 23,133 tons (flour) to 39,244 tons in 1947. Now the report urges better organisation for collection, processing, and marketing.

As for essential oils, co-operation in growing, distilling and research, and unified selling are needed to ensure sound grading and efficient sale; and several varieties now grown mainly outside the Empire should be produced in the Colonies, although they cannot compare in importance with the major Colonial products.

Many essential oils are referred to in the report, the production of which the Committee discourages as commercially unsound for various reasons.

* *Second Report of the Colonial Primary Products Committee.* Pp. 59. H.M.S.O. Price 1s. net.

World Cereals Today

(*Concluded from page* 209)

sumption of particular foods as the actual and future grain supply changes. In the United Kingdom before the war, our own growers were adequately protected as far as wheat was concerned, and at the same time wheat from the four corners of the earth was purchased freely at all times in relation to its quality. This is the position we must, somehow or other, restore, as it is in this way alone we can achieve improvement in living standards throughout the world.

Abstract of a paper read by Mr. C. A. Loombe, of Joseph Rank, Ltd., at a joint meeting of the Food Group and London Section of the Society of Chemical Industry.

The Classification of Bacteria

J. G. DAVIS, D.Sc., Ph.D., F.R.I.C.

There is probably no subject in science more controversial than the naming and classifying of bacteria. The sixth edition of Bergey's well-known volume* will be received with much interest by all bacteriologists, whether they agree with the classifications therein or not, for it provides an invaluable work of reference, giving the cultural characteristics of, and references for, virtually all known species of bacteria.

THE latest classification provides an interesting contrast to the earliest classifications such as those of Cohn, Migula, Fischer, and Lehmann and Neumann. It is indeed a far cry from the simplicity of "bacteria, cocci, and vibrios" to the elaborate system described in the new Bergey, which includes 1,630 recognised species apart from others which are mentioned.

The historical review of systems of classification (pp. 5 to 38) will be of great interest to the pure bacteriologist (if any exists), and perhaps more so to those graduating from botany rather than chemistry or medicine. The rules of nomenclature (pp. 49 to 64) will be mainly of interest to taxonomists, but the chapter on "How bacteria are named and identified," by Prof. R. E. Buchanan, should be read by all interested in the subject.

Food Spoilage Bacteria

The present classification is summarised in Table 1, which illustrates the division of the class *Schizomycetes* or fission fungi into five Orders, of which the first, or *Eubacteriales* (true bacteria), is by far the most important for the food bacteriologist. Table II shows the division of the *Eubacteriales* into three Sub-Orders, of which we are interested mainly in the first—the *Eubacteriineae*—which includes almost all the bacteria of interest from the point of view of disease and food spoilage. The *Eubacteriineae* are further divided into thirteen families (Table 3), and these are further divided into *Tribes* (although not all *Families* have *Tribes*), and the *Tribes* (or *Families*) into *Genera*. Each *Genus* consists of one or more species. Thus *B. coli* or *Bact. coli* or *Escherichia coli* is a species in the Genus *Escherichia* in the Tribe *Escherichieae* in the Family *Enterobactericeae*.

Changes in Classification

Reading through the 6th Edition of Bergey and comparing it with the 5th Edition, which has been in use since 1939, is rather like coming back to the House of Commons after a general election—there are some new faces, some old ones are no longer with us, and there has been a rearrangement of constituencies. Thus, while the general classification remains the same, there are some important changes likely to cause considerable argument. In order to help the British reader to appreciate the new Bergey, the Wilson and Miles classification has been given in Table 4, and in Table 5 an attempt has been made to compare all three classifications in one table. The various genera mentioned in the 5th Edition of Bergey and the 3rd Edition of Wilson and Miles have been set out

* *Manual of Determinative Bacteriology*. Pp. 1529. 1948. Baillière, Tindall, and Cox. Price 84s.

TABLE 1

CLASS: SCHIZOMYCETES

Microscopic, unicellular plants; frequently motile; no definitely organised nucleus; multiplication by cell division; may be free-living, saprophytic, parasitic, or pathogenic; endospores sometimes formed.

ORDER I: EUBACTERIALES *True or Lower Bacteria.*	ORDER II: ACTINOMYCETALES *Higher Bacteria.*	ORDER III: CHLAMYDOBACTERIALES *Iron and Sulphur Bacteria.*	ORDER IV: MYXOBACTERIALES *Slime Bacteria.*	ORDER V SPIROCHAETALES *Marine and Water Organisms.*
Rigid cells in chains or masses; no branching or mycelium; not arranged in filaments; not acid-fast.	Elongated cells having tendency to branch; either acid-fast or form spores and mycelium.	Filamentous, colourless, alga-like bacteria; may have sheath of iron hydroxide; some motile and produce conidia but never endospores.	Long, slender, flexible cells; thin spreading colonies; fruiting bodies usually pigmented.	Long, slender, flexous, spiral cells; motile; multiply by transverse fission.

TABLE 2

ORDER I: EUBACTERIALES

SUB-ORDER I: EUBACTERIINEAE	SUB-ORDER II: CAULOBACTERIINEAE	SUB-ORDER III: RHODOBACTERIINEAE
No photosynthetic pigments. No free sulphur. Not attached by stalk. Do not deposit ferric hydroxide.	No photosynthetic pigments or free sulphur. Attached by stalk. Some deposit ferric hydroxide.	Photosynthetic chlorophyll-like pigments. Some contain free sulphur.

TABLE 3*

ORDER I: EUBACTERIALES

Sub-order I: EUBACTERIINEAE

Family.	*Tribe.*	*Genus.*
I. Nitrobacteriaceae	I. Nitrobacterieae	I. Nitrosomonas VI. Nitrobacter
	II. Hydrogenomonadeae	I. Hydrogenomonas
	III. Thiobacilleae	I. Thiobacillus
II. Pseudomonadaceae	I. Pseudomonadeae	I. Pseudomonas
	II. Spirilleae ...	I. Vibrio VI. Spirillum
III. Azotobacteriaceae	... ...	I. Azotobacter
IV. Rhizobiaceae	... ...	I. Rhizobium III. Chromobacterium
V. Micrococcaceae	... ...	I. Micrococcus II. Gaffkya III. Sarcina
VI. Neisseriaceae	... ...	I. Neisseria
VII. Lactobacteriaceae	I. Streptococceae	I. Diplococcus II. Streptococcus III. Leuconostoc
	II. Lactobacilleae	I. Lactobacillus II. Microbacterium III. Propionibacterium IV. Butyribacterium
VIII. Corynebacteriaceae	... ...	I. Corynebacterium
IX. Achromobacteriaceae	... ...	I. Alcaligenes II. Achromobacter III. Flavobacterium
X. Enterobacteriaceae	I. Escherichieae	I. Escherichia II. Aerobacter
	II. Erwineae ...	I. Erwinia
	III. Serrateae ...	I. Serratia
	IV. Proteae ...	I. Proteus
	V. Salmonelleae	I. Salmonella II. Shigella
XI. Parvobacteriaceae	I. Pasteurelleae II. Brucelleae III. Bacteroideae IV. Hemophileae	
XII. Bacteriaceae	... ...	I. Bacterium
XIII. Bacillaceae	... ...	I. Bacillus II. Clostridium

* This table gives an abbreviated classification of the lower bacteria as described in Bergey.

vis-à-vis those in the 6th of Bergey. The most important changes in the 6th Edition are as follows:

1. The number of genera of autotrophic bacteria has been increased from three to seven in Tribe 1 and reduced from three to one in Tribe 2.

2. The Family *Pseudomonoaceae* has been entirely reclassified, Tribe 1 (straight rods) now including Acetobacter, formerly a Family in its own right, and Tribe 2, including the spirally curved types, the total number of genera being increased from eight to twelve.

3. *Alcaligenes* is taken from its association with *Chromobacterium* in Family 2 (5th Edition) and placed with *Achromobacter* in Family 9 (6th Edition).

4. *Staphylococcus* is absorbed into *Micrococcus* and so disappears as a generic name.

5. *Microbacterium* is taken from Family Bacteriaceae and placed in Family Lactobacillaceae with *Lactobacillus*.

6. *Corynebacterium* is removed bodily from an entirely different order—the Actinomycetales—and placed in the Eubacteriales to form the basis of a new Family Corynebacteriaceae.

7. Family 11—the Bacteriaceae in the 5th Edition—containing 10 genera has been reduced to one Genus in the 6th Edition, and the other 9 genera redistributed in other Families.

8. *Eberthella* has been absorbed into *Salmonella* and so disappears as a genus.

The Sub-Order II (Caulobacteriineae) is not of any special interest to food bacteriologists, consisting almost entirely of organisms inhabiting iron-containing waters. Sub-Order III (Rhodobacteriineae) includes the purple and green sulphur bacteria found in H_2S-containing mud and water.

Order II (Actinomycetales) consists of cells showing a definite tendency to branching, and includes many micro-organisms of medical interest such as *Myco. tuberculosis* and other acid-fast organisms in Family I. The Actinomycetaceae (Family II) include *Nocardia* and *Actinomyces* in which the mycelium may become septate, and spores may be produced on aerial hyphae. Family III (Streptomycetaceae) includes *Streptomyces* and *Micromonospora* which are predominantly soil micro-organisms.

Order III (Chlamydobacteriales) consists of filamentous, colourless, alga-like bacteria common in water. The Myxobacteriales (slime bacteria) form Order IV and are common in dung, rotting

TABLE 4

WILSON AND MILES' CLASSIFICATION

Order.	*Family.*	*Tribe.*	*Genus.*
Myxobacteriales			
Thiobacteriales			
Chlamydobacteriales			
Actinomycetales	Actinomycetaceae		Actinobacillus
			Leptotrichia
			Actinomyces
			Erysipelothrix
	Mycobacteriaceae		Mycobacterium
			Corynebacterium
			Fusiformis ...
			Pfeifferella ...
Eubacteriales	Nitrobacteriaceae		Hydrogenomonas
			Methanomonas
		Nitrobactereae	Carboxydomonas
			Acetobacter
			Nitrosomonas
			Nitrobacter
		Azotobactereae	Azotobacter
			Rhizobium
	Pseudomonodaceae		Pseudomonas
	Spirillaceae ...		Vibrio
			Spirillum
	Coccaceae ...	Neissereae ...	Neisseria
		Streptococceae	Leuconostoc
			Streptococcus
			Staphylococcus
		Micrococceae	Micrococcus
			Sarcina
			Rhodococcus
	Bacteriaceae	Chromobactereae ...	Chromobacterium
			Achromobacterium
		Zopfeae ...	Zopfius
		Bactereae ...	Proteus
			Bacterium
			Salmonella
			Shigella
		Lactobacilleae ...	Lactobacillus
		Pasteurelleae ...	Pasteurella
		Haemophileae ...	Haemophilus
			Brucella
	Bacillaceae ...		Bacillus
			Clostridium

vegetable matter, etc. The Spirochaetales of Order V have a spiral cell and are motile; they range from free-living water forms such as *Spirochaeta* to delicate parasites such as *Treponema*.

Three valuable supplements are given in the new edition—No. 1 the Rickettsia, No. 2 the viruses, and No. 3 the organisms of bovine pleuro-pneumonia and similar types.

Order Rickettsiales consists of very small cells of variable shape which can usually only be propagated in living tissue. These are not filterable, and form a link between the true bacteria and the viruses. They cause many diseases in man and animals, including the typhus fevers. The Order Virales has been created to include those cells which pass bacteria-retaining filters and which multiply only in the presence of living matter. They are recognised by the diseases they cause in animals, plants, and bacteria.

The changes in the classification of the higher bacteria, etc., are summarised in Table 6.

Some of these changes are not important from the fundamental point of view, but the treatment of Corynebacterium will doubtless make some workers wonder what significance can be attached to such highly complicated systems and involved nomenclature when such drastic changes are made. The threat to *Staphylococcus* and *Shigella* is not likely to be accepted quietly by British bacteriologists. There is, of course, no fundamental right or wrong in such considerations, and the final verdict may well be decided by what determines good English—common usage.

The new Bergey may prompt us to consider the classification of bacteria from a number of aspects. Bacteriologists become what they are from a variety of backgrounds — medical, veterinary, chemical, botanical, zoological, agricultural, dairy-

TABLE 5

6th Edition, Bergey

ORDER: EUBACTERIALES

Sub-Order: EUBACTERIINEAE

* The first letter of the genus name is used in this table for brevity.

Genus.	*Chief Characteristics*	*No. of Species.*	*Type Species.*
I.			
1. Nitrosomonas	Oxidise ammonia and/or nitrite to nitrate	2	N.* europaea
Nitrosococcus		1	N. nitrosus
Nitrosospira		2	N. briensis
Nitrosocystis		2	N. javanensis
Nitrosogloea		3	N. merismoides
Nitrobacter		2	N. winogradskyi
Nitrocystis		2	N. sarcinoides
2. Hydrogenomonas	Oxidise hydrogen	3	H. pantotropha
3. Thiobacillus	Oxidise sulphur, etc.	5	T. thioparus
II.			
1. Pseudomonas	Produce water-soluble green pigments	148	P. aeruginosa (B. pyocyaneus)
Xanthomonas	Plant pathogens producing water-insoluble yellow pigment	47	X. hyacinthi
Pseudomonas (?)	" (?)	15	P. fermentans
Methanomonas	Oxidise methane	1	M. methanica
Acetobacter	Oxidise ethyl alcohol, etc., to acetic acid, etc.	7	A. aceti (acetic acid bacteria)
Protaminobacter	Metabolise alkyl amines.	2	P. alboflavum
Mycoplana	Utilise phenol	2	M. dimorpha
2. Vibrio	Curved cells; water types; some parasitic	22	V. comma (cholera vibrio)
Desulfovibrio	Anaerobes reducing sulphates to sulphides	3	D. desulfuricans
Cellvibrio	Oxidise cellulose; yellow or brown pigment	4	C. ochraceus
Cellfalcicula	Short-pointed rods; oxidise cellulose	3	C. viridis
Thiospira	Colourless, motile rods containing sulphur granules	2	T. winogradski
Spirillum	Long screws or turns; aerobic; motile; in fresh or salt water	9	S. undula
III.			
Azotobacter	Large rods or cocci; no spores; aerobic; fix nitrogen in presence of carbohydrate, etc.; in soil and water	3	A. chroococcum
IV.			
Rhizobium	Fix free nitrogen when growing symbiotically on the roots of *Leguminosae*	6	R. leguminosarum
Agrobacterium	Plant pathogens or non-chromogenic soil or water saprophytes; do not fix nitrogen	4	A. tumefaciens
Chromobacterium	Soil and water saprophytes producing a violet pigment	3	C. violaceum
V.			
Micrococcus	Round cells without definite arrangement; yellow to red pigment	22	M. luteus
Gaffkya	Form tetrads under certain conditions; parasitic	2	G. tetragena
Sarcina	Form packets of eight cells; yellow or orange pigment	9	S. ventriculi
VI.			
Neisseria	Small, parasitic diplococci	11	N. gonorrhoeae (Gonococcus)
Veillonella	Very small, anaerobic cocci in masses	2	V. parvula
VII.			
1. Diplococcus	Parasitic cocci usually in pairs	6	D. pneumoniae (Pneumococcus)
Streptococcus	Cocci in pairs or chains; parasitic or saprophytic; some anaerobic	24	S. pyogenes
Leuconostoc	Produce mainly lactic acid Morphology variable; produce slime in sucrose media; heterofermentive	3	L. mesenteroides

5th Edition, Bergey.		*Wilson and Miles (Topley and Wilson's "Principles of Bacteriology and Immunity").*	
I.			
Nitrobacter	6	Nitrobacter	1
Nitrosomonas	4	Nitrosomonas	2
Nitrosococcus	1		
Hydrogenomonas	3	Hydrogenomonas	—
Methanomonas	1	Methanomonas	—
Carboxydomonas	1	Carboxydomonas	—
Thiobacillus	8		
III.			
		Pseudomonas	5
1. Pseudomonas	31		
Phytomonas	137		
Protaminobacter	5		
Mycoplana	2		
2. Vibrio	21	Vibrio	12
Cellvibrio	4		
Cellfacicula	3	Spirillum	5
Spirillum	4		
IV.			
Acetobacter	15	Acetobacter	—
V.			
Azotobacter	2	Azotobacter	2
II.			
Rhizobium	6	Rhizobium	1
Chromobacterium	3		
Alcaligines	10		
		Chromobacterium	12
VI.			
Micrococcus	46	Micrococcus	11
		Rhodococcus	4
		Staphylococcus	3
Staphylococcus	9		
Gaffkya	4		
Sarcina	14	Sarcina	5
VII.			
Neisseria	11	Neisseria	10
Veillonella	2		
IX.			
Diplococcus	7	Streptococcus	6
Streptococcus	21		
Leuconostoc	3	Leuconostoc	3

Genus.	*Chief Characteristics.*	*No. of Species.*	*Type Species.*	*5th Edition, Bergey.*	*Wilson and Miles Topley and Wilson's "Principles of Bacteriology and Immunity").*
2. Lactobacillus	Rods; never parasitic Catalase negative. Homo- or heterofermentive	15	L. caucasicus	Lactobacillus - 15	Lactobacillus - 16
Microbacterium	Small rods; contain catalase; heat resistant	2	M. lacticum	Propionibacterium - - 11	
Propionibacterium	Variable morphology; usually contain catalase; produce propionic acid	11	P. freudenreichii		
Butyribacterium	Form acetic and butyric acids	1	B. rettgeri		
VIII.				XI.	
Corynebacterium	Beaded cells of highly variable morphology; mostly parasitic on animals and plants	25	C. diphtheriae	Listerella - 1 Microbacterium - 3 Kurthia - 2	Corynebacterium - 16 Zopfius - - —
Listeria	Small aerobic rods; cause a monocytosis in warm-blooded animals	1	L. monocytogenes	Cellulomonas - 26 Achromobacter - 42	
Erysipelothrix	Micro-aerophilic rods pathogenic to warm-blooded animals	3	E. rhusiopathiae (swine erysipelas)	Flavobacterium 58	Erysipelothrix - 3
IX.					
Alcaligenes	Non-chromogenic, non-saccharolytic rods turning litmus milk alkaline	6	A. faecalis	Actinobacillus - 3 Bacteroides - 23	
Achromobacter	Saccharolytic properties variable but never strong	12	A. liquefaciens	Fusobacterium - 4	Achromobacterium - —
Flavobacterium	Yellow or orange pigment	27	F. aquatile	Bacterium - 16	
X.				X.	
1. Escherichia	Faecal origin; acid and gas from lactose; methyl red positive; does not produce acetoin	3	E. coli	Escherichia - 2	Bacterium - - 4
Aerobacter	Methyl red negative; produces acetoin	2	A. aerogenes	Aerobacter - 2	
Klebsiella	Short rods found in respiratory tract; frequently encapsulated	1	K. pneumoniae	Klebsiella - 6	
2. Erwinia	Motile rods requiring organic nitrogen; parasitic on plants	22	E. amylovora	Erwinia - - 13	
3. Serratia	Small rods producing a pink or red pigment	5	S. marcescens	Serratia - - 6	
4. Proteus	Markedly pleomorphic rods generally producing amoeboid colonies	4	P. vulgaris	Proteus - - 8	Proteus - - 8
5. Salmonella	Usually produces gas from dextrose	151	S. paratyphi	Salmonella - 37 Eberthella - 14	Salmonella - - 147
Shigella	Usually no gas from dextrose	11	S. dysenteriae	Shigella - - 15	Shigella - - 6
XI.				VIII.	
1. Pasteurella	Pathogenic, small rods; bipolar staining; usually ferment carbohydrates	5	P. multocida	Pasteurella - 8	Pasteurella - - 3
Malleomyces	Produce glanders, etc.; milk slowly coagulated	2	M. mallei	Malleomyces - 2	Pfeifferella - - 2
Actinobacillus	Produce actinomycosis, etc.; milk unchanged or slightly acid	3	A. lignieresi		
2. Brucella	Pathogenic, non-saccarolytic short rods	4	B. melitensis	Brucella - - 4	Brucella - - 4
3. Bacteroides	Obligate anaerobes; rounded rods	23	B. fragilis		
Fusobacterium	Obligate anaerobes; pointed rods	4	F. plantivicenti		Fusiformis - - 7
4. Haemophilus	Delicate, minute parasites; non-motile, occurring singly	7	H. influenzae	Haemophilus - 8	Haemophilus - 8
Moraxella	Occurring singly or in pairs	3	M. lacunata		
5. Noguchia	Small rods producing follicular conjunctivitis	3	N. granulosis	Noguchia - 3	
Dialister	Strictly anaerobic, minute rods; growing only in fresh tissue, etc.	2	D. pneumosintes	Dialister - 2	
XII.					
Bacterium	Rods without spores; rather mixed characteristics	50	B. erythrogenes		
XIII.				XII.	
Bacillus	Spore-forming rods; aerobic; catalase positive	33	B. subtilis (hay bacillus)	Bacillus - - 146	Bacillus - - 8
Clostridium	Spore-forming rods; anaerobic; catalase negative	11	C. butyricum (butyric acid bacteria)	Clostridium - 51	Clostridium - - 25
				(Corynebacterium is Genus I of the family Mycobacteriaceae in Order II — Actinomycetales)	

The large Roman numerals refer to FAMILIES. The Arabic numerals refer to TRIBES. The figure after each genus refers to the number of species recognised in that genus.

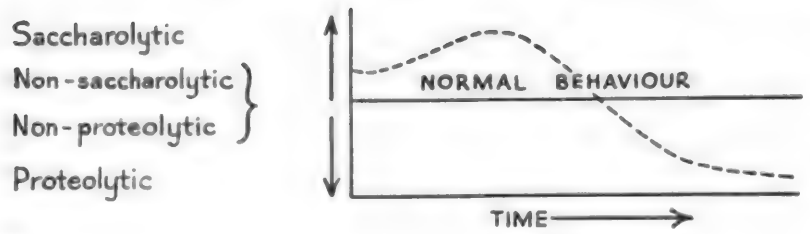


Fig. 1.

ing, etc.—and it is interesting to see how their background affects the approach to classification problems; in fact, the background is more real than the classification. One has only to compare Wilson and Miles with Orla-Jensen, for example, to grasp this fundamental difference in approach. Any one worker is naturally interested in his own field, and tends to attach much importance to this and little or none to other interests.

Thus it is common to find a medical bacteriologist recognising many species of pathogenic streptococci and one or two dairy species, while the dairy bacteriologist reverses the process. It follows that the prime factor determining the number of species recognised by a bacteriologist is his experience of, and interest in, the types considered. This almost entirely accounts for the widely different classifications given in various textbooks and monographs.

Varying Properties of Bacteria

The solution to the problem would appear to be to go to the appropriate experts in each field, and this is, in fact, the method adopted in Bergey. Unfortunately experts do not always agree, and it is doubtful if they ever will, on the subject of classifying bacteria. The same aspect controls the reasoning when deciding the number of species to be accepted in a group of closely related bacteria. To what are we to give pre-eminence in deciding on species rank—morphology, antigenic structure, biochemical reactions, or some other factor? Who is to decide which property is more important than another? What constitutes a species in bacteriology? Unfortunately no one can give a simple answer to this question, and in practice workers used the terms "type" and "strain" frequently to avoid the implications of the word *species*.

The fatal mistake made by some bacteriologists, and especially those who have not had a good biological training, is to regard a species as a single, rigid type of organism, and to regard a bacterium as an organism having fixed properties. *A micro-organism should be regarded not as a static entity, but as a dynamic, potentially varying organism.* This means that any micro-organism may not only vary in its properties continuously, but may develop a startling new property, *e.g.* encapsulation, pigment-formation, proteolytic powers, etc., at any time. Such changes are undoubtedly bound up with the rapid reproductive rate. Thus while man reproduces himself, say, every thirty years, bacteria divide under favourable conditions in fifteen minutes, and one cell can become 1,000,000 in five hours. The reproductive rate of bacteria is thus about 1,000,000 times that of man.

Strain Variation

Any bacteriologist who has studied any one strain of micro-organism over a period of years will be familiar with the variations encountered in its properties. In addition to encapsulation and pigment formation, a bacterium may tend to develop either its saccharolytic or proteolytic powers (usually not both together) and vary in its vigour of growth, reaction to oxygen, antigenic structure, number of flagella, morphology, ability to produce acid and gas in various sugars and in other properties. Thus *Str. faecalis* may develop the power to ferment glycerine and become what some bacteriologists call *Str. glycerinaceus*, or liquefy gelatine to become *Str. liquefaciens*. Thus the behaviour of a strain is represented pictorially in Fig. 1. Strain variation is not confined to two properties, and so we can use the idea of a cylinder to express variation in a number of directions, see Fig. 2.

Fig. 2.

Naturally more than one property can be acquired or lost at a time. Although such variations are at times rather startling there is a limit to their extent, and so the behaviour of any strain may be regarded as circumscribed in an orbit like a woman with a limited number of dresses—she can change her appearance freely, but in a limited number of ways. Thus *L. brevis* (*L. pentoaceticus*) can vary from almost a coccus to a longish rod, and can produce a rich red-brown pigment (*L. rudensis*), but it has never been known to produce spores, or become motile or become catalase-positive. *We can thus define a species as strains varying inside a defined orbit.* Any strain which can be classified in a given orbit is given that species name, and any strain not conforming to this orbit cannot be accepted.

TABLE 6

BERGEY

6th Edition.		*5th Edition.*
Order II: ACTINOMYCETALES		Order II: ACTINOMYCETALES
1. Mycobacterium 2. Nocardia Actinomyces 3. Streptomyces Micromonospora		1. Corynebacterium Mycobacterium 2. Leptotrichia Erysipelothrix Proactinomyces Actinomyces
Order III: CHLAMYDOBACTERIALES		Order III: CHLAMYDOBACTERIALES
1. Sphaerotilus Clonothrix Leptothrix		1. Sphaerotilus Clonothrix Leptothrix Crenothrix
		[Order IV: CAULOBACTERIALES*]
2. Crenothrox 3. Thiotrix Beggiatoa Thiospirillopsis Thioploca	=	Order V: THIOBACTERIALES
Order IV: MYXOBACTERIALES		Order VI: MYXOBACTERIALES
1. Cytophaga 2. Archangium Stelangium 3. Sorangium 4. Polyangium Synangium Melittangium Podangium Chondromyces 5. Myxococcus Chondrococcus Angiococcus Sporocytophaga		1. Archangium Stelangium 2. Sorangium 3. Polyangium Synangium Melittangium Podangium Chondromyces 4. Myxococcus Chondrococcus Angiococcus
Order V: SPIROCHAETALES		Order VII: SPIROCHAETALES
1. Spirochaeta Saprospira Cristispira 2. Borrelia Treponema Leptospira		1. Spirochaeta Saprospira Cristispira Borrelia Treponema Leptospira
Order RICKETTSIALES 3 Families 10 Genera		—
Order VIRALES 3 Sub-orders 13 Families 32 Genera		—

* In the 6th Edition this Order is absorbed in Order I. The arabic numerals on the left of the genera names refer to families. The names refer to genera.

Test for Species

The same method can be extended to Genera, Tribes, Families, etc., and the test for species inside a Genus is whether their orbits overlap other orbits. In practice orbits frequently overlap and intermediates must be recognised. There is nothing fundamental about a species in Nature—a species is a man-made conception. Further, the properties defining an orbit are obviously a matter of judgment. Thus *Str. cremoris* is closely related to *Str. lactis*, but if variants of these never become identical, there is justification for separate species rank. In practice it is often possible to select characteristics which are permanent, and these are chosen as characteristic of the species. Thus *Str. pyogenes* is invariably and *Str. lactis* never β-haemolytic.

Foundation of Universal Classification

Summing up, it will be evident that any system of classifying bacteria must be highly controversial because:

(i) Classification must be based on properties of the organism and new properties are always coming to light.

(ii) The assessment of the relative importance of the various types of properties in deciding on species, etc., must inevitably be a subjective matter, and bacteriologists quite naturally exaggerate the importance of their own interests. The serologist classifies species antigenically, the chemist biochemically, and so on.

However one may disagree with the classification suggested in the new Bergey, there can be no doubt that it forms an invaluable work of reference and will probably become the foundation of the ultimate, universal classification—if such a thing ever becomes a reality.

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

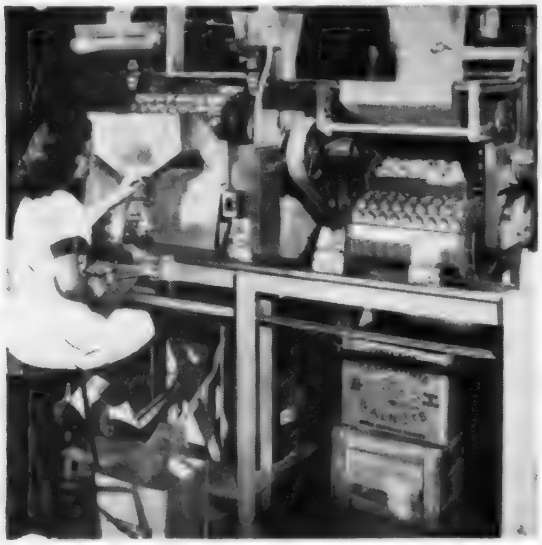
Walnut Packaging in California

Before the war the trend to consumer packaging for convenience in self-service markets was fully apparent. Trade pressure for this type of package grew to such proportions that experiments were undertaken in 1941 which have resulted in the establishment of a new plant in Vernon, an industrial suburb of Los Angeles, California, exclusively for the processing of in-shell walnuts.

General view of one of the three units in the new plant of the California Walnut Growers' Association.

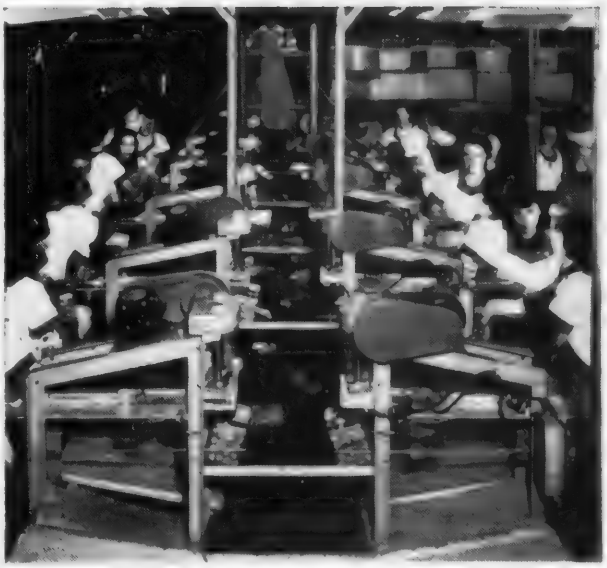
THE plant, which cost three-quarters of a million dollars, comprises two and a half acres of floor space, and is devoted entirely to the packaging of nuts in 1 lb. Cellophane bags. It was built by the California Walnut Growers' Association, a farmers' marketing co-operative, consisting of 9,300 grower-members in the State of California. The Association handles 85 per cent. of all the in-shell walnuts produced in the United States. Its brand is internationally known.

At the peak of production last autumn the plant worked two shifts daily and employed 800 persons, mostly women. It developed a capacity of one thousand 1 lb. Cellophane bags per minute, or a



Adaptations of the branding machines, with some pockets blanked out so as to discharge intermittent loads, deliver approximately one pound of nuts into the Cellophane bags.

Weighers check each bag on fast-registering scales calibrated to show the number of nuts over or under weight. Nuts are fed through the pipes from the main storage bins.



Above: **From the check-weighers, filled bags pass along to the sealing line.** *Right:* **The sealed bags drop on to an endless belt for conveyance to the packing tables.**

ton of walnuts every two minutes—by far the largest nut packaging operation in the world.

The packages were well received by the trade, and the marketing of in-shell walnuts in this convenient pack will, it is hoped, be instrumental in expanding consumption to a more desirable year-round basis. The 1 lb. bags are packed fifty to a fibreboard carton.

In addition to this consumer pack, over half the season's crop was packed in the conventional 100 lb. burlap bags. It is anticipated that more than half of next season's crop will be packed in the new 1 lb. packages.

The nuts first go through the branding machines, after which they are elevated into storage bins placed above the batteries of filling machines It is interesting to note that the filling machines are merely adaptations of the branders.

Approximately 1 lb. weights of nuts are dumped into the Cellophane bags, the preliminary measurement being by "count." This operation proceeds at the rate of twenty-five bags per minute. The bags are then passed down to the check-weighers who add the one or two nuts required to bring the weight up to 1 lb. or a fraction of a nut overweight. From the check-weighers the bags move to batteries of heat-sealers, and then to packing table belts where they are placed in cases. These cases are subsequently closed by automatic top and bottom gluers. Most of the equipment, including the heat-sealers, was designed and developed in the engineering department of the Association itself, the exceptions being the scales and carton gluers.

Each of the packing units has two sides. Cases are held at a convenient angle for inserting separators, pads, and bags, and are then conveyed to the sealing machine.

Ministry of Food

Latest Statutory Instruments

The list given below is the continuation of the list of Orders published in *Food Manufacture*, April 1, 1949, page 158.

1949

PRICE FIXATION

127 Jan. 30. Order amending the Cheese (Control and Maximum Prices) Order, 1948. Revokes S.I. 1948, Nos. 1850 and 2634.

190 Feb. 4. Order amending the Chocolate, Sugar, Confectionery and Cocoa Products (Control and Maximum Prices) Order, 1948.

233 ,, 21. Order amending the Feeding Stuffs (Maximum Prices) Order, 1948.

500 Apr. 1. The Feeding Stuffs (Prices) Order, 1949. Revokes S.I. 1948, Nos. 169, 1685 and 2419; 1949, No. 233.

502 ,, 1. Order amending the Barley (Control and Prices) (Great Britain) Order, 1947 and the Barley (Control and Prices) (Northern Ireland) Order, 1947.

503 ,, 1. Order amending the Dredge Corn (Control and Prices) (Great Britain) Order, 1947, and the Dredge Corn (Control and Prices) (Northern Ireland) Order, 1947.

504 ,, 1. Order amending the Milk Powder (Maximum Prices) Order, 1947.

505 ,, 3. Order amending the Soap (Maximum Retail Prices) Order, 1947.

BREAD

169 Feb. 7. Order amending the Bread (Control and Maximum Prices) Order, 1947.

EGGS

272 Feb. 27. Order amending the Eggs (Control and Prices) (Great Britain) Order, 1946. Revokes S.I. 1948, No. 150.

306 Mar. 6. Order amending the Eggs (Control and Prices) (Northern Ireland) Order, 1947. Revokes S.I. 1948, No. 151.

FRUIT

252 Feb. 28. Order revoking the Soft Fruit Order, 1947, and the Root Vegetables Order, 1948.

MEAT

506 Mar. 27. Order amending the Meat (Rationing) Order, 1948.

MILK

307 Mar. 6. Order amending the Milk (Control and Maximum Prices) (Great Britain) Order, 1947. Revokes S.I. 1948, No. 1686.

POINTS RATIONING

147 Jan. 30. Order amending the Food (Points Rationing) Order, 1948.

POTATOES

121 Feb. 1. Order amending the Ware Potatoes (1948 Crop) (No. 2) Order, 1948. Revokes S.I. 1948, No. 2673.

407 Mar. 13. Order amending the Ware Potatoes (1948 Crop) (No. 2) Order, 1948.

RATIONING

146 Jan. 30. Order amending the Fats, Cheese and Tea (Rationing) Order, 1948.

SOAP

2808 ,, 30. Order amending the Soap (Licensing of Manufacturers and Rationing) Order, 1948.

VEGETABLES

5 ,, 9. Order revoking the Cooked Beetroot Order, 1946. Revokes S.R. and O. 1946, No. 1737.

Faults in Bread

THE examination of a loaf and faults in bread were the subject of an address given by Mr. R. C. Bartlett, of Procea Products, to the monthly meeting of the Midland Trade Executives Guild held in Derby on March 29.

In all there were some twenty-three features to look for when examining a loaf; these were pointed out by the speaker with a short explanation of each characteristic. Pointing out the faults in some loaves which had been specially baked for the purpose, Mr. Bartlett said that bakers could not always be blamed for poor quality bread, and he expressed the hope that some improvement might be expected in flour, particularly a lower rate of extraction, in the near future.

To achieve correct dough ripeness and consequently quality bread with present-day flour, it was necessary to give a bulk fermentation time of three to four hours; faulty fermentation was the cause of the more general faults to be found in bread. Some faults in machine-moulded loaves were due to excessive pressure, and better results would probably be obtained if the pressure boards were loosened. Another important factor in the production of shapely bread, with a clear crumb and good eye appeal, was correct humidity; too much steam during baking often produced tough leathery crusts.

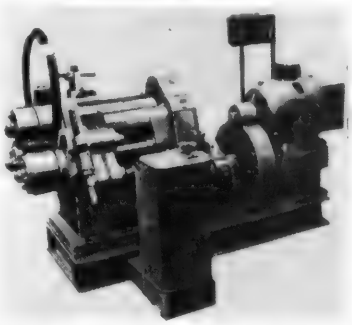
Deploring the lack of interest the average staff took in bread production, Mr. Bartlett felt that this was due to insufficient knowledge of the trade, more particularly of the complex changes which took place during fermentation and baking. Occasional talks by the proprietors or an executive, the examination of competitors' bread, the issue of weekly reports on the merits of the home loaf, participation in competitions, and visits to exhibitions were some of the suggestions put forward for increasing interest on the part of the staff.

British Industries Fair, 1949

BIRMINGHAM

A wide range of plant and equipment of interest to the food manufacturer is being shown in the Engineering and Hardware Section of the Fair at Birmingham (Castle Bromwich).

A varied selection of machines and tools for sheet metal working will be seen on F. J. Edwards' stand D.411. Models seen for the first time include an open fronted vertical section bending rolls, a 36-ton production press brake, and a multiple turret punch. A punching press, trimming and beading machine, all-steel folding machine, and combination set for shearing, notching, and bending



Besco vertical open end section bending machine.

angle sections in the manufacture of frames are numbered among the exhibits on this stand.

Among their exhibits of beer tanks, chemical plant, cylinders, washing troughs, and other equipment on stand B.519, W. P. Butterfield are showing a stainless steel mixing vessel, complete with cover in three sections, three-bladed agitator, and shaft totally enclosed motor. Items of interest to the food industry on stand D.123 include a stainless steel wine tank, a stainless steel jacketed pan, and a working model of a vertical sugar drier, all manufactured by Robert Jenkins and Co.

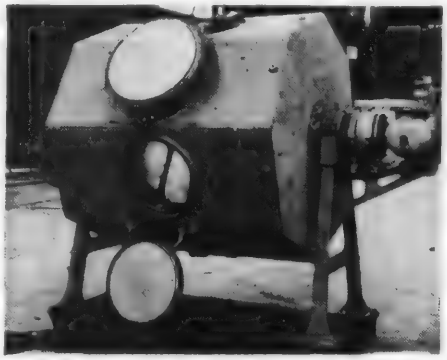
Advice and assistance to all those engaged in international trade are provided by the Midland Bank, who are maintaining a mobile unit at Birmingham in addition to stands at Olympia and Earls Court.

A combined melting and mixing stainless steel plant comprising two jacketed vessels, the melting pan of which is power tilted, will comprise one of the exhibits to be seen at the stand of Thompson Bros. (Bilston) (Stand D.642). At the same stand the company will be showing a xanthating churn for the viscose industry. This vessel is fabricated from stainless-clad plate, jacketed, and complete with mechanism for rotating the body.

Visitors will be welcomed at the Leonard Hill stand (Olympia, ground floor, B.54) where a selection of the journals and of the latest technical publications of the House will be displayed. Members of the staff will be available throughout the exhibition to deal with any enquiries.

Metal and Plastic Spraying

Equipment for metal and plastic spraying by the powder process made by the Schori Metallising Process is shown on stand D.524 and frequent spraying demonstrations are being given. Food vessels coated with tin, and worn shafts built up with various metals, as well as various other metal and plastic sprayed examples, are being exhibited, and there is a working model of a pneumatic ring drier.



Xanthating churn by Thompson Bros. for the viscose industry.

Industrial Brushware

Visitors to stand D.586 may see tubes of a model condenser cleaned with a bullet brush from a compression gun. The "condenser" is also used for showing the installation of flow-breakers for high efficiency heat transfer. In addition to a wide range of Kleen-e-ze brushes used for processing, polishing, cleaning, and innumerable other purposes, there are specimens of patent tube cleaners and burnishers in sizes to unload any straight or bent pipes, and a modern draught excluder.

Newman totally enclosed loom motor.

Industrial Motors

Principal interest at stand C.306 is focused on a selection of the Newman industrial range and fractional h.p. A.C. motors. In the industrial range a series of totally enclosed, fan-cooled, squirrel-cage motors, including a typical double cage, high torque motor, are shown. Flameproof motors available in either fan- or natural-cooled design as well as examples of starters including direct-on-line and direct-on-reversing contactor types are also being exhibited.

Mr. C. T. Stern of Marinha Grande, Portugal, is visiting the British Industries Fair. His address will be Cranston's Ivanhoe Hotel, Bloomsbury Street, London, W.C. 1.

Automatic Weighing Machines

A new automatic weighing machine being exhibited for the first time in this country can be seen at the stand (D.147) of Industrial Products (Speco).

The model weighs free-flowing and semi free-flowing dry products at predetermined net weights from ½ oz. to 2½ oz. Other models of weighing machines are also being shown. This recently formed company will market automatic box-making, weighing, wrapping and packaging plant developed by American companies, and arrangements have been made for the manufacture in Great Britain of some of the industrial machinery of these companies.

Conveyors

Prominence on stand D.522 is given to a conveyor installation of combined "MotaVeyor" and "RolaVeyor" which will be in continuous operation throughout the period of the exhibition. The MotaVeyor powered belt conveyor is made in two types, as an extensible unit type or as a continuous-belt assembly for conveying powders and small components. In addition to the RolaVeyor, a gravity roller conveyor of unit design, J. Collis are showing their TransVeyor table, stackers in electric-hydraulic and manual-hydraulic types, and a hydraulic lifting truck for platform systems.

Valves

An interesting innovation on stand D.129 is a new valve model, capable of being "rodded through" to break up hardened fluids, which is supplied with bodies in various materials. Both large and small models demonstrate the principle of the standard Saunders diaphragm valve, and quick operation, remote control, and pressure actuation can be seen in various forms in addition to the standard handwheel method operation. Prominent among the pump models exhibited by this firm is the self-contained "Unishaft" electric set. Extremes in the range of sizes are emphasised by displaying the smallest model fixed to the flange of the largest.

Pumps

A prototype of a new range of stainless steel Mono pumps, which can be completely dismantled by the removal of two wing nuts and one drive pin, is on view at stand D.716. Included among the positive rotary, self-priming pumps for clear, viscous, or abrasive fluids which are on show are the standard "H" type pumps for handling edible products. A recent development of the Mono pump is the introduction of metal stators which extend its application to the pumping of highly viscous mixtures of temperatures up to 350° F.

Ejectopump for liquids.

A liquid pump operated by compressed air, known as the Ejectopump, will be shown by Gresham and Craven on stand D.139. The operation of this pump is entirely pneumatic and a regular cycle of suction and discharge strokes is automatically maintained. Capable of handling any liquids, irrespective of their character or viscosity, at temperatures up to boiling point, the pump is self-priming; no aeration of the pumped liquid occurs and suspended or included solids of considerable size can be pumped by the employment of a special suction and discharge valve.

Protective Preparations

A range of barrier preparations effective against most of the known industrial skin irritants is being shown at the Rozalex stand (D.706), as well as a dispenser for the quick supply of an economic quantity to work people.

Cranes and Machine Tools

A comprehensive range of equipment is to be shown by George Cohen, Sons and Co. and other companies in the 600 Group at stand D.604 and D Outdoor. Exhibits will include cranes, machine tools, woodworking machines, petrol/paraffin engines, castings, iron powders, and hydraulic presses.

Industrial Compounds

Belt dressing, tinning and waterproofing compounds, jointing paste, and flux-core solders, which dispense with the need for separate fluxing, are some of the exhibits of Thomas and Bishop on stand D.145. In addition the firm are showing their metal-to-metal jointing for both flange and screwed pipe, black bituminous paint, scale eliminator for boilers and steam pipes, kneadable metallic packing, and refractory furnace cements.

Beltings

Fractional horse-power V-belt drives, for which thinner section V-belts and pressed steel pulleys have been perfected, are being featured by J. H. Fenner on stand D.229. Standard V-belts as well as specially constructed steel cable, rayon cord, and static heat and oil resisting types are being shown, while other exhibits include various mechanical rubber goods, patented Z-dressed woven beltings, leather beltings, mechanical leathers, and a full range of industrial tapes and webbings.

Aluminium Alloys

The answer to queries regarding aluminium alloys can be obtained at stand B.723 where the Almin and associated companies are exhibiting. Films depicting the erection of a transportable storage building and factory fabricated buildings are being shown, and a photographic display gives details of aluminium alloy roof construction. Extrusions, tubes, and forgings, a range of large food and liquid containers, fish and other transport boxes in heavy gauge aluminium alloy are also on view, while a special feature is being made of "Warco" canteen furniture.

Heating Equipment

The display at the stand of Bastian and Allen (C.710) includes a small model of a low frequency induction heater with energy controller, suitable for heating small press tools requiring a temperature range up to 400° F. Also on show are a range of electrode steam boilers and hot water boilers, and a new proportionate load controller which varies automatically the electrical input in accordance with the steam pressure so that the load is constantly varying to meet the steam demand. There is a standard electric storage water heater, together with various types of immersion heater elements.

Graiseley pedestrian controlled electric vehicle.

Electrical Plant and Equipment

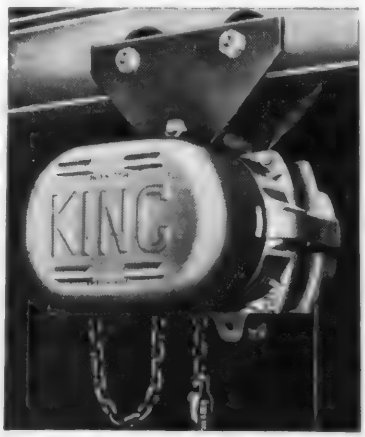
Probably the largest single piece of electrical equipment ever shown at the Fair is a 275,000-volt oil break circuit-breaker unit weighing over 10 tons and measuring over 23 feet high exhibited by the British Thomson-Houston Co. on stands C.511 and 410. Electronic motor control equipment is being demonstrated and gas turbine work is represented by a model of a 1,200 h.p. gas turbine-alternator. In addition to a selection of lamps and lighting equipment, exhibits include motor units of various types, stator and rotor units for building into machine tools, suds pumps, and silent gears, and visitors can watch the operation of a thrustor modified for the occasion by replacing the standard oil tank by one made of "Perspex."

Haulage Vehicles

The most recent production of E. Boydell, who are exhibiting on stands D.611 and 510, is a loader, an outstanding feature of which is the six-point suspension in which the front axle is fixed to the frame. This enables the loader to withstand a tilt of the main frame up to 27° from vertical. Another patented feature is the automatic bucket reset device which resets the bucket at approaching ground level, no matter at what height it has been tipped. The firm are also exhibiting models of dumpers possessing a patented two-way drive which enables them to be used both in normal dumper fashion and as road vehicles.

Electric Vehicles

Examples of the industrial type pedestrian controlled electric vehicle made by Diamond Motors, together with a number of assembled components including a complete power unit comprising driving motor, centrifugal clutch, reduction gear box, and control and steering column may be seen on stand C.227. On stand D.404 are electric chain pulley blocks, overhead runways, and a system for track electrification, hand pulley blocks, overhead crane and conveyor components, and electric industrial trucks produced by Geo. W. King. This firm is also exhibiting for the first time their electric chain pulley block. In addition to an electric elevating truck, Ransomes, Sims and Jefferies are showing their type TE electric tractor designed for drawing trailers in factories, warehouses and goods depots on stand A.605.



King electric crane pulley block.

Small Tools

An unusual feature at stand D.630, where the Edgar Allen Co. are exhibiting, is a number of "deep" pictures showing a rotary cooler, a jaw crusher, examples of the company's trackwork, typical steel castings, and a group of permanent magnets, all photographed in three dimensions. A display of dies made from the company's steels, a series of moulds, hobs, etc., for the plastics industry, and a wide range of small tools for engineers are also on view.

Stainless Steel Canteen Units

All types of stainless steel equipment for the food and chemical industries, including fabricated tanks, ducting, and coils, can be seen on stand B.315 where Taylor Rustless Fittings are exhibiting. One of the special sinks being supplied for the reporters' suite kitchen at the House of Commons and an example of a canteen unit are also on view at this stand. A comprehensive range of sinks, bar equipment, including top frontages, drip trays, beer and fining funnels, and display cases are to be viewed on stand B.500 where W. H. Paul are displaying their new series of stainless steel sink and drainer cabinets.

Valves, Fittings, and Heating Equipment

Those concerned with the installation and maintenance of pipe lines for water, steam, oil, and gas services will find a comprehensive display of the requisite fittings on Crane's stand (B.516). A large portion of this stand will be devoted to the display of cast iron and gunmetal valves suitable for various working pressures and temperatures and made with either screwed or flanged connexions. Examples of sectional heating boilers with capacities up to 1½ million B.Th.U's per hour, domestic boilers, and various types of radiators will also be exhibited.

Gas-fired Equipment

Designed to show the part played by the gas industry in speeding export drive production, the British Gas Council (C.619/518) will exhibit some of the latest gas appliances and processes. One of the most interesting demonstrations to be staged is that showing manipulative glass working under gas heat. This exhibit also includes the use of a gas-fired forced circulation hot-air furnace. A further new development is the use of gas for immersion heating. This method is being developed for water heating for industrial purposes and is used in the melting of soft metals. There will also be a wide range of ancillary plant, including burners, safety appliances, measuring and controlling instruments, air-gas proportioning valves, and soldering equipment.

Emulsifying Equipment

For use in the manufacture of ice cream mixes, mayonnaise and other homogenised mixtures, creams and cream fillings used in the bakery and confectionery trades, and for the preparation of pharmaceutical products, the "Bel" power emulsifier is now back in production and will be shown by British Emulsifiers on stand A.524. Fitted with a ¾ h.p. motor with automatic overload switch, the emulsifier has an adjustable pressure up to 3,000 lb. per square in., and an output of 15 gal. an hour.

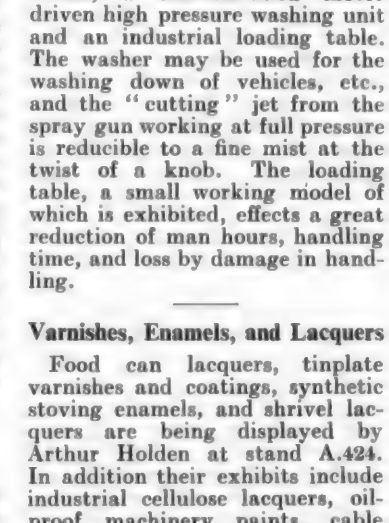
Tecalemit self-contained washing unit.

Lubrication Equipment

Among the many types of equipment, including mechanical lubricators, metered lubrication systems, lubricating pumps, hand guns, and nipples, which Tecalemit are showing on stands D.421 and 322, are two recent developments, a self-contained motor driven high pressure washing unit and an industrial loading table. The washer may be used for the washing down of vehicles, etc., and the "cutting" jet from the spray gun working at full pressure is reducible to a fine mist at the twist of a knob. The loading table, a small working model of which is exhibited, effects a great reduction of man hours, handling time, and loss by damage in handling.

Varnishes, Enamels, and Lacquers

Food can lacquers, tinplate varnishes and coatings, synthetic stoving enamels, and shrivel lacquers are being displayed by Arthur Holden at stand A.424. In addition their exhibits include industrial cellulose lacquers, oil-proof machinery paints, cable lacquers, and collapsible tube enamels.



"Bel" power emulsifier.

Industrial Rubber Equipment

Conveyor belting, the normal fabric foundation of which is covered with a specially compounded white rubber, is one of the many types manufactured by the Dunlop Rubber Co. which are exhibited on stand D.519. This belting meets the exacting demands for cleanliness in food factories and does not affect the taste of unwrapped food. Other industrial rubber goods on show include tubing, sheet insertion, rubber covered rollers, anti-corrosion rubber, and flooring and mats.

OLYMPIA

Heat Treatment Apparatus

An electronic heat generator designed for heat treating all forms of metals, woods, textiles, plastics, glues, etc., is being exhibited on stand C.134 by Airmec Laboratories, makers of electronic apparatus for industry and research. Made in two models, this instrument incorporates air-cooled oscillator valves which obviate the necessity of any water supply. A process timer is fitted for employment if fixed cycles of operation are required.

Hydrolysates

Many well-known brands of bouillon and cubes, canned soups and stews, sauces, powdered soups, and gravy powder, all containing "Protex" and/or "Yeatex," are displayed in a giant hamper by Fredk. Boehm on stand B.50. Also shown are brands of lecithin and glycerine for which the company act as sole distributors, as well as carotene manufactured by their associated company, The British Chlorophyll Co., for the fortification and colouring of many food products.

Containers

Container decoration is the main theme of the Metal Box stand (D.18) which will illustrate the fine finishes that can be achieved with modern methods and materials. The company will also have stands at Birmingham (A.331) and Earls Court (T.1). The Birmingham stand will be devoted to hardware and compressed cork products. A demonstration of can-reforming and seaming machinery will be given at Earls Court.

Chemical and Pharmaceutical Machinery

A wide range of tablet machines, presses, drug mills, and granulating mixers are to be shown by Manesty Machines on stand D.21/22, who are also exhibiting several entirely new models included in which are coating pans, rotary tablet machines, single stroke tablet machines, and a drying oven.

Storage Equipment

All types of steel storage equipment for office and factory, made by J. Glover and Sons, can be seen on stand E.83. Particularly interesting are the mobile storage units for use where storage space is limited. Fixed shelving, bins, racks, partitioning, lockers, and many other types of office and factory equipment are also displayed.

Stationery

Stand M.69 is divided into sections devoted to the various products of the Samuel Jones Co. In the stationery section is a model of an average stationer's shop, complete with a display of miniature reproductions of "Butterfly Brand" products, while moisture controlled sealing machines and a new tape shooter are on display in the gumstrip sealing tape section. In addition to adhesives, new tacky labels are being demonstrated and non-curling gummed papers, coated papers and boards, and special coated and impregnated papers are being shown.

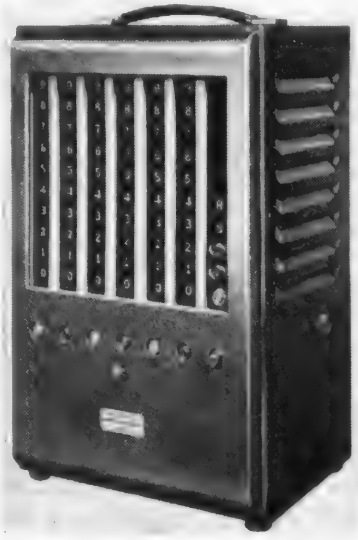
Collapsible Tubes

Of the many types of tin, tin-coated lead, lead, and aluminium collapsible tubes on view at stand D.17, those made of aluminium are expected to make the biggest appeal to food packers. These tubes are made by the Flexile Metal Co. in two grades of purity and are satisfactory for packing most neutral products such as petroleum jelly, lanoline, and industrial greases. The metal is attractive in appearance, does not discolour, is entirely non-toxic, and does not alter the flavour or colour of products which are packed in it.

Baldwin moisture meter.

Scientific Instruments

Among the range of scientific instruments on view at stand C.19, the Baldwin Instrument Co. are showing a moisture meter for the rapid measurement of the moisture content of foodstuffs such as grain, etc. Indication is given on a moving-coil indicating instrument and the readings are converted to moisture content by a chart for each particular foodstuff required. Special electrodes are supplied to adapt the meter to solid materials such as paper, etc. The radiological electrometer also on view has application to food manufacturers with X-ray equipment installed to examine their products for foreign bodies.



Marconi electronic counter.

Four instruments of special interest to the food industry will be displayed on the Marconi stand (C.21). These are the portable direct-reading *p*H meter with a range of from 1 to 11 *p*H; a new moisture meter for the determination of the moisture content of grain, cereal products, and other hygroscopic foodstuffs; a thickness meter which provides a non-destructive method of measuring the thickness of paint, lacquer, or plating on a ferrous base; and an electronic counter for counting at ultra-high speeds objects coming from a machine or production line. The display will also include other industrial instruments together with communications test gear.

Chemicals

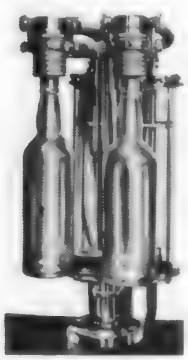
Equal prominence is being given to precipitated calcium carbonate and citric acid by John and E. Sturge on stand B.15. A photo-montage illustrates the main stages in the production of precipitated calcium carbonate, and coloured photomicrographs of mould cultures of citric acid are also on view together with actual growing moulds shown through a binocular microscope. Publications of the company on these products are available at the stand.

The production of water soluble and oil soluble oxidation and fermentation inhibitors of oils, fats, protein solutions, etc., will be shown by the Watford Chemical Co. on stand B.16, together with two new food preservatives under the names of Stabalin 1 and Stabalin 2. New products for the food industry which have been developed cover (1) emulsifying agents; (2) glutamic acid and its sodium salts; and (3) cocoa butter base, lecithin, and waxes.

Essences and Flavours

Samples of a new antifrothing agent which, it is claimed, is effective on all types of foam, are being exhibited by A. Boake, Roberts on stand B.33. Samples of their range of powdered flavours, including "Drydex" bun spice, as well as fruit extracts, solid fat flavours, and fat-soluble flavours in powder form for the food trade, are available.

Filling Machines



The latest "Vacfill" machines developed by Busby, Winter and Co. are to be found on stand D.12. Capable of handling a large variety of liquids and semi-solids, these machines incorporate interceptors of heat resisting glass, enabling liquids at high temperature to be filled with safety. An exact height of fill in each bottle is controlled automatically and different nozzles are available to fit containers of varying sizes. An outstanding feature of the fillers is that they automatically reject leaky containers before filling can take place.

Industrial Appliances

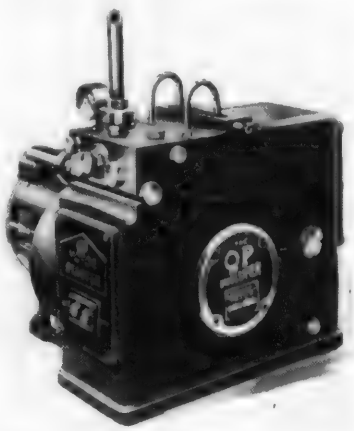
In addition to their exhibits of pneumatic sack cleaning equipment, boiler flue dust removal plant and central vacuum cleaning installations at Birmingham, and industrial portable cleaners at Earls Court, the British Vacuum Cleaner and Engineering Co. are showing on several stands at Olympia. On stand G.54 in the Radio Section may be seen "Magneta" industrial radio, synchronous clock systems, and amplifiers, while on stand H.553 there are electric clocks and timing apparatus. The Office Appliance Section is on stand E.48.

Chemicals from Petroleum

Visitors to the Shell Chemicals stand (B.13) will see large-scale models of Earls Court, Castle Bromwich, and Olympia, with every stand represented and every special feature in its place. Thus the Fair itself will be the main feature of the stand in order to illustrate the varied use of chemicals derived from petroleum in industry. Intermittent lighting of specific sections of each model will be synchronised with illuminated wall panels showing the chemicals used by the industry represented in that section.

Homogenisers

On stand B.44 Ormerod Engineers are showing a comprehensive range of homogenisers and emulsifiers, extending from a hand-operated model to a power machine delivering at 100 gal. per hour. These machines are precision built and incorporate a patent homogenising valve which may be adjusted to determine the ultimate globule size of the emulsion. On the larger machines a special automatically damped pressure gauge is fitted which gives accurate readings over a considerable range.



Q.P. power emulsifier.

Cartons and Display Outers

Of interest to many trades is the display on stand M.120 of a wide range of printed folding cartons and display outers. Very many of these have been designed by Alfred Eva and Son in their own studios and finalised completely in their factory, and a high percentage have been manufactured especially for packing for export purposes.

EARLS COURT

Welded Tubes and Cylinders

On stand X.49 Evolite Plastics are showing a range of their tubing, together with photographs of several applications of interest to the food industry. Formed from "Perspex" sheet, their welded acrylic tubing is available in a range of standard sizes and can be used for the handling of such foods as milk and beer, and also in the manufacture of lighting fittings.

Barrier Creams

Food manufacturers will be interested in two barrier creams and a new type of distributor for use with them being exhibited by Sternol on stand R.77. "Sternocleanse" No. 6, which is tasteless and odourless, is specially prepared for use in the food manufacturing industry, while No. 2 is recommended for workers handling aqueous solutions or those engaged in preparing vegetables prior to canning.

Plastics

A new plastic which possesses extreme chemical inertness and solvent-resistance, good electrical and mechanical properties at high temperatures can be seen among the exhibits of Imperial Chemical Industries at stands X.21 and 34 in the Plastics Division.

Samples of the new "Fluon"—which is sold as a fibrous white powder—as well as specimens of various types of industrial mouldings are displayed. Another exhibit illustrates the uses of "Alkathene" film, particularly for packing frozen foods, while a shock moulding unit demonstrates the shock moulding process with "Perspex" acrylic sheet.

Food-preparing Equipment

A range of food-preparing machines comprising meat mincers, sausage fillers, mixers, potato peelers and chippers, vegetable slicing machines, and moulding and filling machines is on view on stands T.7 and 14 in the Foodstuffs Section. The machines are made by Peerless and Ericsson in a range of sizes and capacities to suit all classes of trade from the one-man business to the largest factories. Of particular interest is a pie and pastry moulder and filler. This is available with double fillers capable of moulding and filling up to 2,000 pieces per hour.

Peerless pie and pastry moulder and filler.

News from the Industry

FORTHCOMING EVENTS

S.C.I. Nutrition Panel

Following the first meeting in January last on "The Sausage as Food," a second meeting is to be held by the Nutrition Panel of the Food Group of the Society of Chemical Industry in the new series on "The Nation's Manufactured Foods" on May 18 at 6.15 at the London School of Hygiene and Tropical Medicine. The subject will be "Biscuits, Cakes, and Other Flour Confectionery as Food."

Papers to be read include "Flour Confectionery—An Introduction" by Mr. W. S. Butterworth, and "Cakes as Food" by Mr. C. H. Fuller. This latter paper is to be followed by a discussion on "Biscuits as Food" to be presented jointly by Dr. D. M. Freeland and Mr. A. Bradley. The final paper will be given by Professor John Yudkin, who will speak on "The Nutritive Value of Flour Confectionery."

Visitors will be welcome at this meeting, at the conclusion of which there will be a general discussion on the subject.

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Health Congress at Brighton

Over 2,000 persons engaged in the improvement of public health will attend the Health Congress of the Royal Sanitary Institute at Brighton from May 23 to 27.

Papers on the applications of space heating and the human angle in the design of industrial buildings will be included among those of interest to engineers and surveyors. In the two-day conference of sanitary inspectors there will be discussions on the subjects of "Housing," "The Collection and Disposal of Refuse and Unsound Food," "The Supervision of Milk Production," and "Meat Inspection in a Small Urban District." Among many others to be read at the Congress will be papers on public health research and the West African groundnuts scheme, as well as a symposium on "The Care and Preservation of Fish as Food." Films of special interest to members and officers of local authorities will also be shown on two afternoons during the week.

Leicestershire Industries Fair

The Leicester and Leicestershire Industries Exhibition and Trade Fair will be held at the Granby Hall, Leicester, from May 19 to 28, 1949. In the food section some Leicestershire manufacturers will be exhibiting food products and stainless steel vessels and food equipment.

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Flexible Packaging Materials

An exhibition of flexible commercial packs and packaging materials, organised jointly by the Council of Industrial Design, the Institute of Packaging, and PATRA, will be held in the Council's exhibition hall from May 3 to 31. Exhibits from over sixty firms will demonstrate some of the more interesting packaging in current use as well as many recent developments.

Three new processes will be shown for the first time in this country. One overcomes the difficulty of fixing durable designs and lettering up PVC film; another prevents any form of metallic corrosion inside a sealed pack; and the third effects a revolution in the manufacture of jute sacks by means of a circular loom.

Super-glycerinated Fat

Particularly recommended for bakers, confectioners, pie manufacturers, and others, although it can be used for practically all purposes to replace ordinary fat, the super-glycerinated fat produced by J. J. Vigon and Co. contains no adulterants and has a fat content of approximately 100 per cent. It conforms to the standard of purity of the Food and Drugs Act.

Apart from use alone, the fat readily forms stable emulsions with water. A 16 lb. emulsion so formed can be used with 32 lb. of cooking fat or lard to give a 33 per cent. extension. The fat or lard is evenly dispersed throughout the dough or cake mixture because of the high emulsifying power of the super-glycerinated fat, and considerable savings are thus made possible.

Aluminium Baking Tins

To offset the shortage of tinplate a new type aluminium baking pan has recently been introduced by Procea Products.

Reports from bakers who have tested these pans show that they possess many advantages over tinplate pans. They are lighter in weight, non-rusting, and require less greasing—an important point in view of the present scarcity of fats.

The pans may be strapped in sets of three or four, thus facilitating handling and ensuring correct spacing in the oven.

Precision Balance Improvements

At a recent display of their balances, comprising chemical, semi-microchemical, and microchemical models, Oertling's included a preview of some notable technical developments. One outstanding advance in bearing design is the adopton of a new material, known as "Corundum," for the planes. By means of an automatic apparatus demonstrated at the display, which could provide in a few days the effects of years of normal wear, the improved performance of planes made of the new material was amply proved.

Another improvement shown was in connexion with the firm's prismatic-reflector device whereby an enlarged optical image of a graticule fixed to the end of the pointer is projected on to a ground glass screen at the top of the balance case. The company have now completely re-designed the whole optical system fitted to all their prismatic balances so that the resultant well-defined image may easily be read in full daylight and from any position in front of the balance case.

Both these improvements are being fitted as standard as from the end of March, and it is hoped to report further outstanding developments before long.

Other exhibits included a method of heat-stabilising, applied to balances being shipped through or to the tropics, and an interesting electrolytic method applied to the testing of rhodium-plated weights.

Left to right: R. Templeton, T. Crosbie-Walsh, R. W. Lowman, H. Hurst, W. Leonard Hill, E. H. B. Palmer, and T. McLachlan.

Leonard Hill Dinner

On the occasion of his appointment as a director of the company, Mr. T. Crosbie-Walsh, F.R.I.C., editor of FOOD MANUFACTURE, was guest of honour at a dinner given by Mr. W. Leonard Hill, chairman of Leonard Hill Limited, at the Trocadero Restaurant on April 6, at which were present a representative company of food chemists, food and food equipment manufacturers, and other distinguished guests.

After the loyal toast had been honoured, Mr. Hill proposed the toast "Mr. T. Crosbie-Walsh." Following the response to this toast, "The Food Chemist and FOOD MANUFACTURE" were proposed by Mr. Brian Reavell and responded to by Mr. A. L. Bacharach and Mr. F. Waddington. The final toast of the evening to the health of the chairman, proposed by Mr. Hal Hurst, was responded to by Mr. Hill.

In addition to members of the staff of the Leonard Hill Group, the following were present:

A. N. Ainsworth, A. J. Amos, R. Allen, A. L. Bacharach, J. V. Backes, L. H. G. Barton, E. B. Bennion, C. E. B. Brett, A. P. Buchanan, A. B. Bush, E. Chilman, H. E. Cox, J. G. Davis, W. E. Dick, T. C. Drake, F. England, T. H. Fairbrother, L. D. Galloway, F. Gerrard, B. Harrison, M. Harrison, D. P. Hopkins, A. Hughes, J. G. Huntley, H. Hurst, W. J. Blois Johnson, H. G. Lawson Johnston, H. Kaufmann, D. W. Kent-Jones, A. L. Kidson, S. T. Killick, W. R. Lewis, R. W. Lowman, N. Martin, T. McLachlan, G. McLaren, S. H. Nicholson, E. H. B. Palmer, C. A. Quin, B. Reavell, J. C. L. Resuggan, G. Rhodes, D. E. Simonds, J. Stewart, L. Stockwell, R. Templeton, J. W. Thomas, H. H. Tyrie, A. R. G. Williams, and J. Yudkin.

Top table: B. Reavell, A. L. Bacharach, G. Lawson Johnston, T. Crosbie-Walsh, W. Leonard Hill, D. W. Kent-Jones, R. Allen, H. E. Cox, and A. B. Bush.

Citrus Fruit Juices Control

Last year there was a considerable shortage of certain varieties of citrus juice, especially orange, and the Ministry has endeavoured to correct the position this season by granting licences at a somewhat higher price than before.

Allottees are warned that no further licences to import juice will be granted until the juice already licensed has been taken up by allottees, and therefore those who do not take up all their allocations when tendered may find themselves unable to obtain juice later on.

Frost Research

A review of the joint programme of research on frost damage and its prevention, now in progress in collaboration with the Fuel Research Station at Greenwich, was presented to members of the East Malling Research Station on March 22.

Dr. W. S. Rogers emphasised the importance of planting fruit in frost-free sites and spoke of the problem of maintaining the orchard temperature above damaging levels, which was being tackled by Mr. Baker and Mr. Sayles of the Fuel Research Station. In this connexion the National Institute of Agricultural Engineering were experimenting with a large horizontal fan which would circulate the air to prevent the accumulation of cold air.

The progress of frost injury to blossoms as observed in the field was described by Dr. Irena Modlibowska.

On the subject of heating, Mr. C. Baker emphasised that no matter how the heating was done 1,000,000 British Thermal Units of heat must be applied to an acre of trees each hour to protect them from a sharp radiation frost and that this was no easy task, bearing in mind that the cost of the equipment and of running it must be kept low.

Changes of Address

The head offices of the Mond Nickel Co., Henry Wiggin and Co., and Mond Nickel (Retirement System) Trustees are now at Sunderland House, Curzon Street, London, W. 1. Telephone: Grosvenor 4131.

Appointments

Mr. E. A. A. Morton, divisional manager of George Borwick and Sons in Ireland since May, 1947, has been promoted to the position of marketing manager. He will be leaving Northern Ireland shortly to take up his new position at the firm's head office in London.

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Dr. E. T. Murdock, formerly with the Metal Box Co., has been appointed chemist in charge of development work in connexion with sausages and meat products by Wall's.

Quick Frozen Foods Association

Mr. S. W. Smedley has been elected first President of the newly formed National Association of Quick Frozen Food Processors at a meeting held on March 24. The following were elected to serve on the Committee:

Mr. Morrisey of Smethhursts.
Mr. Mitchell of Birds Eye Sales.
Mr. Gates of Frostegen.
Mr. Appleyard of Grimsby Frozen Products.
Mr. Hood of Newforge.
Mr. W. V. Smedley of Smedley's.
Mr. Muirhead of Frigid Fruits.
Mr. Pettit of Pettitt's.

Society of Public Analysts

At the seventy-fifth annual general meeting of the Society of Public Analysts and Other Analytical Chemists held on March 9 under the chairmanship of the President, Mr. Lewis Eynon, B.Sc., F.R.I.C., the following officers and members of council were elected for the ensuing year:

President: George Taylor, O.B.E., F.R.I.C.

Past Presidents serving on the Council: F. W. F. Arnaud, Lewis Eynon, E. B. Hughes, G. Roche Lynch, S. E. Melling, G. W. Monier-Williams.

Vice-Presidents: C. A. Adams, H. E. Cox, J. R. Nicholls, J. G. Sherratt (Chairman, North of England Section), J. Sword (Chairman, Scottish Section).

Hon. Treasurer: J. H. Hamence.

Hon. Secretary: K. A. Williams.

Other Members of Council: N. L. Allport, R. C. Chirnside, J. F. Clark, D. C. Garratt, J. G. A. Griffiths, E. T. Illing, J. King, J. E. Page, C. J. Regan, F. A. Robinson, N. Strafford, A. M. Ward, A. Lees (Hon. Secretary, North of England Section), and R. S. Watson (Hon. Secretary, Scottish Section).

Fibreboard Containers

GROWTH OF THE INDUSTRY

A denial that America is far ahead of Great Britain in regard to packing was made by Mr. J. Castle at a recent meeting of the Institute of Packaging. So far as design and general workmanship were concerned America had nothing to show us; as to methods of production Mr. Castle said that he would leave that to the technical engineers.

One great advantage of the fibreboard container was that it weighed one-fifth of a wooden container of the same size; moreover the cost of the container was invariably less than one of wood. The enormous growth of the corrugated industry could be realised by going round to the grocer and asking for a few wooden boxes. Practically all his stock would now be in paperboard containers.

In 1916 a survey was made in America showing that at this time 37 per cent. of the containers used were solid and the rest corrugated. Now only 5 per cent. of the containers are solid, the rest all corrugated. In Great Britain, however, solid and corrugated, generally speaking, ran side by side.

After pointing out the economies of the fibreboard container and the way in which it fulfilled all the demands made on it, Mr. Castle considered the question of the shape and size of the pack. This, he maintained, should be that of a brick. Experience had shown that the regular slotted container, *i.e.* the one piece blank, joined at one of the edges and closed top and bottom by four flaps, still remained supreme.

S.C.I. Food Group

The following have been appointed for the session 1949-1950 by the committee of the Society of Chemical Industry Food Group:

Chairman: Mr. A. L. Bacharach.
Vice-Chairman: Dr. E. B. Hughes.
Hon. Treasurer: Dr. J. R. Nicholls.
Hon. Secretary: Mr. L. H. G. Barton.

Practical Printers for Technological Laboratories

A team of practical printers has now been added to the staff of scientists of the Printing, Packaging and Allied Trades Research Association; Mr. H. W. Berridge, D.S.O., D.F.C., the Printing Liaison Officer, is now in charge of the Technological Laboratories, and Mr. G. W. Soundy, Mr. H. T. Rogers, and Mr. L. E. Lawson, all of whom have had practical experience in the trade, have been added to the staff.

The laboratory staff will assist in the solution of everyday workshop problems, and research work in the scientific laboratories will be tried out under practical conditions. Technical research will also be undertaken so as to aid members in improving the performance of the actual operation and in applying the results of research in their own works.

Stainless Steel Pipe Fittings

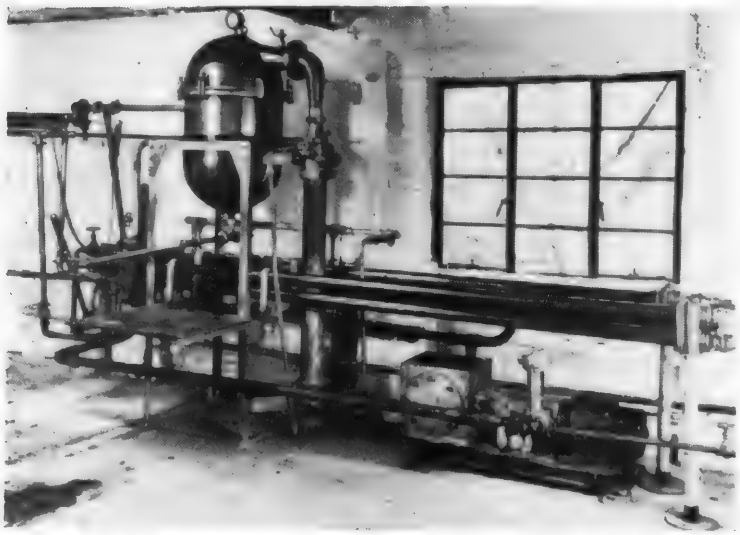
A complete range of welded and expanded pipe fittings now being manufactured will enable the provision of stainless steel contacts throughout processing installations for milk and other potable liquids.

For the construction of pipe lines on site, the expanded joint overcomes difficulties encountered with other types; by using the special set of tools supplied, for sale or hire, by the A.P.V. Co., pipes can be cut to the required lengths and expanded into the standard male parts or liners supplied to make strong and leak-proof joints in a few minutes.

Welded fittings are supplied with factory-built installations and for all purposes where the exact length of pipe is known beforehand. A clean, one-piece, straight-through joint is provided in this type of fitting by welding the pipe on to the male part or liner by a special process developed by the company.

More Canned Fish from Cornwall

Plans for increasing their seasonal output of canned fish to 40,000 cans by the coming winter have been put into operation by Cornish Products, of Looe, Cornwall, by the installation of new machinery.



Part of the plant for the production of concentrated fruit and vegetable juices.

Developments in Fruit and Vegetable Juices

Specialised developments are taking place at the Old Mill, Down St. Mary, in Devon, where Mr. Charles Reid, a Scot, and Mr. T. H. Friis Andersen, a Dane, both fruit juice experts of wide experience, have transformed an old mill into a fruit juice factory, which is producing concentrated fruit and vegetable juices with the enzyme and cell life preserved in an active condition without the use of preservatives.

The apple has been chosen as the principal fruit, because its juice has long been known as the best food to activate yeast for the baker to improve the quality of bread. It can also be used as a confection which is claimed to aid digestion.

The beetroot has been chosen as another product. Red beetroot juice has an objectionable earthy taste which has hitherto prevented its use. Mr. Reid's and Mr. Andersen's experiments have led them to the conclusion that the earthy taste originates from condensed vapours absorbed by the root vegetable during its growth, and they devised a patented plant on new principles for the extraction of esters and the objectionable vapours. The plant was built by a well-known British firm, and the result has been the production of a concentrated sweet red juice with a delightful flavour and containing the full vitamin, mineral salt, and other ingredients of the original root. The operation of the ester plant will be extended to the purification of other plant and animal juices—including milk.

A new company is being formed to take over the present work, which will be greatly extended.

F.M.S. Bulletin

In addition to reports of progress from the various areas of operation, the latest F.M.S. bulletin, well illustrated as usual, contains an account of the organisation's displays at a number of shows in different parts of the country and some interesting articles on dairy feed mixtures and the fruit juice industry.

Fruit Juice Firm's History

Founded in 1864 by Lauchlan Rose, grandfather of the present chairman, the firm of L. Rose and Co. started to produce preserved fruit juices at a time when non-alcoholic fruit juice drinks were practically unknown, and the method of preservation used then is still the normal practice of the industry today. A recently published booklet, *The House of Rose*, gives a brief history of the progress of the firm up to 1948 and is well illustrated with pictures of the company's estates and factories.

Obituary

We regret to record the death of Mr. C. E. Hodgkin, chairman of the board of directors of the Pulsometer Engineering Co.

The centrally planned kitchen services two dining halls.

A Factory Canteen Kitchen

A fine example of a works canteen installed at Horner's sweet factory, Chester-le-Street, consists of a centrally placed kitchen, servicing two dining halls, capable of accommodating 400 people. The kitchen is equipped with modern gas-heating appliances for the cooking and servicing of light and main meals. An excellent range of fancy cakes is baked daily for the morning and afternoon tea breaks. The efficiency of the canteen is illustrated by the fact that 250 people can be served in ten minutes.

Master Bakers go to France

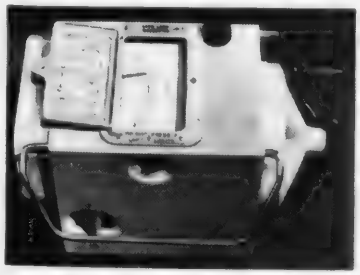
Attending a French Congress for the first time in the history of the Association, representatives of the National Association of Master Bakers were present at a four-day conference of the French Federation of Bakers in Paris recently. Sixteen nations were represented at the congress, and subjects discussed included bread prices, industrial and co-operative bakeries, hygiene, and working hours.

Earthometer Tester

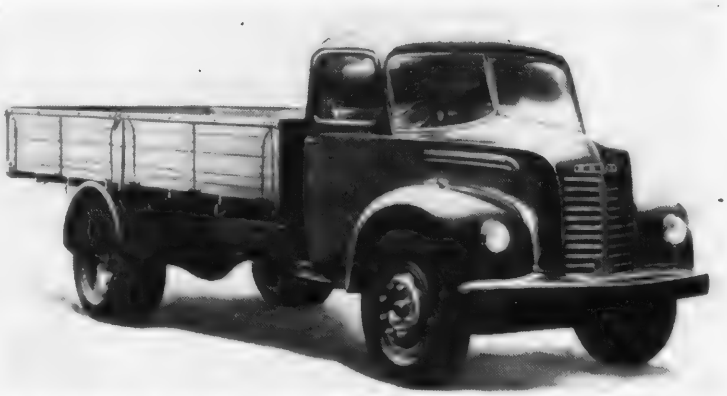
The impedance of a complete earthing circuit, which includes the resistance to earth of the earth electrodes at both the consumer's premises and at the substation, can be quickly and easily measured by the "Megger" earthometer tester recently placed on the market by Evershed and Vignoles.

To make a test it is necessary only to connect the instrument between the neutral conductor (at a plug socket or lampholder) and the earthed frame of the apparatus. Tests are made with the circuit alive, and as temporary earth spikes are not required, a series of tests can be made very quickly. In addition the instrument can be used in the same way as the "Megger" earth tester for measuring the resistance to earth of individual earth electrodes.

The instrument comprises a hand-driven generator and direct reading moving coil ohmmeter, mounted together in a cast aluminium case. A live line detector in the form of a neon lamp is situated in the top of the case, and a press button switch short circuits this lamp while a measurement is being made.



Tests can be quickly carried out with the new earthometer tester with the circuit alive.



The all-steel cab of the new Dodge truck provides a high standard of comfort for the driver.

Kew-built Truck Range

Featuring an entirely new frontal treatment and embodying many outstanding mechanical improvements, a range of Kew-built truck chassis introduced by Dodge Bros. caters for a wide variety of hauling assignments. Notable advancements incorporated in the new models include an all-steel cab of welded construction, "Hydrovac" servo-assisted hydraulic brakes, dual cylinder two-leading shoe front wheel brakes, chassis frames of greatly increased dimensions, high efficiency steering, and redesigned front suspension.

The series comprises seven distinct models with nominal payload ratings ranging from 2 tons to 6 tons. There are long and short wheelbase chassis, all powered by six-cylinder engines of the petrol or Diesel type according to specification. Semi-forward control has been retained, but by moving the power unit forward 9 in. and the front axle 3 in. it has been possible to provide a much roomier cab without sacrificing load space or engine accessibility.

Industrial Trucks

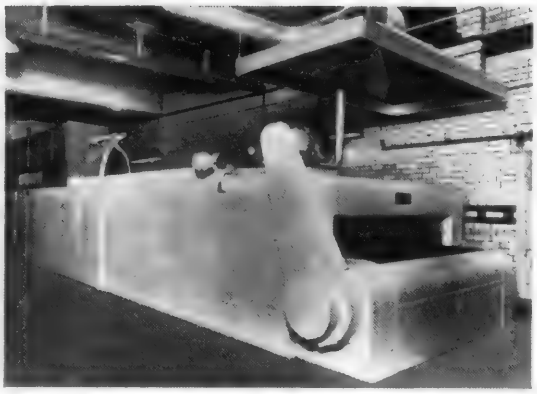
Easily manoeuvred and operated by "instinctive steering," the "Electric Eel" industrial trucks are versatile and economical, and a description of their low-lift truck with lifting platform for loads up to 50 cwt. and their 30 cwt. load carrier with fixed steel or wooden platform is contained in a new booklet produced by Steels Engineering Products.

Hydraulic Lifting Trucks

Hydraulic lifting trucks with a maximum load capacity of 10 cwt., which are easily manoeuvrable in stores and machine shop gangways are being produced by Power Jacks. The platform of these trucks is raised to the maximum height in under a minute and descends at a controlled speed which cannot be exceeded in any circumstances. Normally the platform descends in about twenty seconds, but in the unlikely event of a failure of the hydraulic system, the platform cannot crash down as a control valve within the body of the lifting ram controls the descent to a safe maximum.

Hydraulic lifting truck with a maximum load capacity of 10 cwt.

All-electric Bakery



When fully equipped, the St. Helen's Co-operative Society will have one of the largest all-electric bakeries in the British Isles. The contract for the scheme, which was obtained by the General Electric Co., comprises the installation of two 50 feet travelling ovens, two double-deck drawplate ovens, an electrode steam boiler, and storage water heaters of varying capacities. It is also proposed to instal further drawplate ovens and a brick-built Vienna oven at a later date.

The two travelling ovens which are already installed are of the straight-through travelling sole-plate type and each oven has a maximum capacity of 1,200 loaves per hour and a total electrical loading of 450 kW. Specially designed heating elements, adequately protected, are fitted throughout the length of the baking chamber above and below the travelling sole-plate.

The oven is divided into four sections, in each of which the top and bottom elements are separately controlled automatically. Mercury-in-steel indicating and automatic controllers with rigid bulb stems extending centrally into each section of the baking chamber provide the means of setting the required temperature, and this in turn ensures the correct temperature sequence throughout the length of the oven.

Sauce History

During a feast once held at Mecca, the Sheikh of Zamzam, mindful of his guest, called: "Where is the drink for the Englishman?" A slave ran in, holding a tray bearing a lonely bottle of Holbrooks Worcestershire sauce. This and many other amusing stories are told in *Trouble Brewing Under Eight Reigns*, a history of the firm produced by Holbrooks to commemorate their sesquicentenary.

Modern Paper Mills

Among the grades of paper at present manufactured by the Aylesford Paper Mills, the Medway Corrugated Paper Co., and other associate companies of the Albert E. Reed Group, are newsprint, mechanical printings, wallpapers, unglazed and M.G. krafts, M.G. sulphites, unglazed and M.G. tissues, M.G. envelope papers, and kraft linerboard.

With an output of 4,000 tons of paper per week, both the mills and the corrugated paper works are of modern design, have the finest machinery available, and employ production methods equal to anything in the U.S.A. or Canada.

The plant is serviced by excellent railway communications, including a small halt for the convenience of the 3,000 employees, and special railway sidings. Water is drawn from nearby wells, all power and steam requirements being produced by the company's own boilers and generators.

One of the last machines to be installed in the mills, prior to the recent war, during which the factories were engaged in the manufacture of aircraft accessories, was a newsprint machine with an output of 1,000 tons of newsprint per week; this machine, over 300 feet in length, is said to be the third largest of its kind in the world.

In the corrugated paper mills, boxes of every size and type are being produced for many industries, including food, and, to meet manufacturers' requirements, there is a technical design and art department which is responsible for producing prototype packages and designs.

Great attention has been paid to the welfare of the staff; among the facilities available are a large canteen, a hairdressing saloon, a surgery, and playing fields.

To ensure that youngsters starting in the firm receive a sound training, there is a work's school which is attended one day a week by both male and female staff under the age of eighteen. Regular evening classes are held, and for those entering the building, paper-making, and engineering departments a full-time training is given.

One of the shipments of olive oil imported by the Olive Oil Association from North Africa.

Booklets Received

The relative merits of mercury in steel and vapour pressure actuated thermometer systems are discussed in non-technical language in a list recently produced by Negretti and Zambra. A re-issue of a pre-war publication, the list is well supplied with diagrams and will be of interest to users of temperature measuring and controlling devices.

*

Because of the corrosion- and heat-resistance of nickel and the high-nickel alloys, tubes in these materials are widely used throughout the chemical, food, processing, and engineering industries. A new publication, *The Fabrication of Monel, Nickel and Inconel Seamless Pipe and Tubing*, produced by Henry Wiggin and Co., deals with specifications and properties of the materials and summarises design calculations. Further sections describe recommended practice for machining, joining, bending, and coiling, and a table of weights and sizes produced is included.

*

Originally a mechanical dust exhausting system was to be found only in a few of the most progressive industrial establishments; now such installations are regarded as essential, not only in order to comply with the law, but also to maintain the required rates of production. For over sixty years the Sturtevant Engineering Co. has made a special study of dust collecting in all its branches and some of the many plants they have installed in various industrial undertakings are illustrated in a booklet produced by the firm on pneumatic dust collecting and conveying.

De-control of Lime Juice

As from March 31, the distribution of lime juice has been released from control and any user requiring this juice for any purpose must now obtain his supplies through the usual trade channels.

The importation of lime juice will be subject to the granting of import licences, and application therefor may be made to the Ministry of Food (Fruit Products Division), Portman Square, London, W. 1.

In view of the desirability of maintaining price uniformity during the control of all varieties, it has now been decided that a rebate of 9d. per gal. will be allowed on all lime juice invoiced to direct allottees at 5s. 3d. per gal. and on sales by distributors at 5s. 9d. per gal. Direct allottees should therefore claim on the Citrus Fruit Juices Control, and others should present claims to their suppliers for the amount of the rebate due to them. Suppliers should prepare a list of sales made by them which should be forwarded to Whinney, Smith and Whinney, 4B, Frederick's Place, Old Jewry, London, E.C. 2, as soon as possible certifying that the quantities are correct, when, upon agreement of the figures, a cheque for the total rebate due will be sent to the supplier in due course for distribution. The final date for the receipt of claims will be May 14.

Users are requested to note:

1. No rebate is likely to be payable on any other variety.
2. De-control of the distribution of any other variety is not contemplated until the 1949 crops have been disposed of.

OBITER DICTA

● What's the use of trying to guess the difference between butter and margarine when there is no margarine?—*Mr. Ivor Thomas, M.P.*

● The Ministry of Food is probably the most fertile of all departments in hatching forms.—*Mr. G. Nutt, secretary of the Derby Grocers' Association.*

● How can we develop great areas and lift the standard of life of the population except by business-like schemes which have a real commercial object?—*Mr. John Strachey.*

● Today the consumer of a piece of meat liked to be certain that it was not whale meat or somebody's Derby filly.—*Mr. A. Tyler, Bath's Chief Health Inspector.*

● Normally I water the milk from the fire hydrant. Lately the water shortage has forced me to go to a creek.—*Brazilian milkman explaining the presence of tadpoles in his customer's milk.*

● The report by a correspondent that one of his fowls recently laid an egg only half an inch in diameter is taken as an indication that British poultry are beginning to relate their output to the bacon ration.—*"Punch."*

● The beef-eating English have become forced vegetarians, the steer is a sacred animal, and the pig an untouchable which can only be sacrificed at certain phases of the moon, with the full support of some of the high priests of the Ministry of Mumbo-Jumbo.—*Mr. Fraser, M.P.*

● The roast beef of old England has not even been replaced by the chilled mutton of the Argentine. We have pawned our South American railways and allowed our butcher to steal the pawn ticket.—*Mr. Philip Fothergill, chairman of the Liberal Party Organisation.*

● When I pointed out the folly of a male shop assistant who was coughing and sneezing near an exposed keg of butter without using a handkerchief, the young lady serving me replied innocently, "Oh, it isn't butter, it's margarine."—*Correspondent to the "Sunday Dispatch."*

Economic Engineering

The object of the Institute of Economic Engineering (incorporating the Production Control Research Group) is to provide facilities for an interchange of ideas throughout industry for the study and application of the economics of production. In furtherance of this object the Institute has produced a new journal series, the first number of which contains articles on incentive schemes, machine and plant efficiency, and accounting, together with management abstracts and a forum section where members' views are published.

Company News

Presiding over the fifteenth annual ordinary general meeting of McDougalls Trust, Mr. Kenneth A. E. Moore, the chairman, said that the business had made great strides prior to the imposition of flour rationing in 1946 and they were doing nearly twice as much work as compared with pre-war years, although at a much reduced profit.

Preference and ordinary share dividends amounting in all to 10 per cent. had already been paid.

News from Overseas

Portable Refractometer

A portable electrically illuminated refractometer for testing and controlling the quality of chemicals, foods, and oils, which affords accurate refractive index readings in less time than was possible with previous instruments, is being produced by Bausch and Lomb, of Rochester, N.Y.

Its detachable prism system may be removed by the user and replaced quickly with a duplicate set to avoid lengthy delays should repairs become necessary.

Four Factories in One

The first Syrian factory constructed since the war is now in production at Homs.

The plant will be divided into four separate production units:

1. The sugar factory will have an estimated capacity of 10,000 tons of sugar annually. This will necessitate the annual production of nearly 80,000 tons of sugar beet.
2. A glucose and starch factory, to produce 5,000 tons annually, from 30,000 tons of sweet corn.
3. A factory for the production of alcohol from sugar residue.
4. A factory for the production of oil and vegetaline, capable of processing 30,000 tons of cotton and other seeds.

The total output of the four-unit plant is likely to reach an estimated 23,000 tons of industrial products annually.

Mechanical Handling in Norway

Some twenty-three engineering firms manufacturing mechanical handling equipment of all kinds sent displays of models, photographs, technical diagrams, films, and descriptive literature to the Mechanical Handling Exhibition staged at Oslo at the end of March.

Interest was shown in stacking and lifting trucks, cranes, and conveyors, demonstrations of which were held out of doors.

A unique form of market research into the requirements of visitors was a feature of the exhibition.

Included among the exhibitors were British Wedge Wire and the General Electric Co.

See-through Food Containers

Although still in the experimental stage, a new plastic sheet sealed container suggests possibilities in the visual merchandising of such items as dried foods, boiled sweets, nuts, coffee, tea, spices, seeds, rice, and tobacco. The flexible plastic sheet will not tear or burst easily and yet has sufficient rigidity for a straight-sided, neat-looking package. Firm seals can be made with can lids.

To form the can, a blank of extruded plastic sheeting is cemented on a mandrel, or bonded electronically, into the shape of a cylinder. For a No. 2 can, this cylinder measures $\frac{7}{8}$ in. in diameter, $4\frac{5}{16}$ in. high and has a 35·53 cubic in. content.

Can lids are applied in a power sealing machine such as is used in standard canning operations. The cylinder, with lids placed on each end, is clamped in the sealer and a lid is automatically sealed on to one end. The cylinder is then removed, filled with the desired material, and replaced in the machine for the sealing of the lid on the other end.

Cow and Gate in Australia

Cow and Gate Proprietary has purchased the Raleigh Co-operative Butter Society's factory at Raleigh, on the Bellingen river in northern New South Wales, about 250 miles from Sydney. The company intends to begin the manufacture of dried milk and baby foods next July.

Meat Cannery for South Africa

More than 200 farmers from the Northern Cape have supported a proposal to establish a meat canning factory in the district by a British firm. The factory is said to require a weekly quota of 500 head of stock, 2,500 gal. of milk, and an unlimited supply of vegetables.

Bacon from Eire?

A marked increase in pig production is reported from Eire, and if the present trend is continued, it is probable that bacon exports will be resumed next autumn.

Irish bacon factories announce that 6,068 pigs were received during the last week in February, an increase of 2,349 over the corresponding week of 1948. For the first six weeks of this year 33,469 pigs were handled by the factories compared with 27,275 for the same period in 1948.

Argentine Fruit Sterilised Afloat

Argentine pears, plums, and grapes, the first ever to arrive in the U.S. under a new in-transit sterilisation project jointly undertaken by the United States Department of Agriculture and the Moore-McCormack Lines, have appeared on the market.

The ship concerned is specially equipped to enable the cargo to be admitted without having to undergo extensive treatment in the Argentine to kill off the Mediterranean fruit fly.

Canada's Trade Fair

A preliminary survey of initial applications indicates that the Food and Beverages Section will be one of the greatest at the 1949 Canadian International Trade Fair to be held from May 30 to June 10.

South Africa is displaying its dried fruit products for the first time in a new bid for the Canadian market. Others in this section include Czechoslovakia, Luxembourg, France, the British West Indies, and Hong-Kong.

Canada has the preponderance of exhibitors in space and numbers of firms, followed by the United Kingdom.

Austerity Measures for South Africa

STRICTER CONTROL OF IMPORTS

The following text of a statement, made by South Africa's Minister of Finance in the House of Assembly on February 24, 1949, has been received by the Board of Trade:

"When the system of quota control of imports was introduced it had of necessity to be based on estimates since information was not at that time available about the extent to which importers had over-committed our exchange resources. More and more information is now becoming available and it is becoming increasingly clear that the over-commitment will require more drastic action. The Government has accordingly decided to take two further measures to deal with the position.

"The first is an extension of the prohibited list. A new list will be published shortly. This will be a comprehensive list intended to effect substantial savings on the present level of expenditure both in non-sterling and in sterling currencies.

"The introduction of exchange control on non-sterling imports has had the effect of increasing the imports from sterling areas. In some measure this is inevitable. The Government is, however, disturbed by increasing evidence that the process of over-commitment has not ceased but has simply been transferred to the sterling area.

"While our sterling assets are still considerable, the rate of depletion over recent weeks has been such that it cannot be allowed to continue unchecked.

"To handle this new problem, as well as to remove certain anomalies inherent in the existing exchange quota system, it has been decided to change over to a system for the physical control of commodities entering the Union, this to be applied to imports from the sterling as well as the non-sterling area.

"The Department of Commerce and Industries will call for certain detailed information from importers. On the basis of these returns permits for the importation of goods, excluding those on the prohibited list, will be issued. From the date of the inception of the permit system, no goods not covered by permit will be allowed entry into the Union from the sterling area.

"As regards imports from non-sterling sources, the existing exchange quota scheme will continue to apply until June 30, 1949. After that date goods imported from non-sterling countries will be permitted entry only on production of an import permit or of evidence that payment therefor has been effected under an available exchange quota.

"Importers are warned that commitments for the importation of goods from the sterling area entered into after the date of this announcement will not necessarily be recognised by the issue of import permits if the extent of such commitments is not regarded by the Department of Commerce and Industries as reasonable with due regard to the category of the goods concerned, the importer's past performance, and his importation since January 1, 1949.

"In giving effect to the Government's decision in this connexion the Department of Commerce and Industries will consult the official representative organisations of commerce and industries.

"I want to take this opportunity of emphasising that the restrictions on imports are of a temporary nature and are designed to preserve the country's exchange resources and not to afford any additional protection to local industries. Any industries which may develop or expand solely as a result of these temporary restrictions on imports will, therefore, have no claim to special protection after the withdrawal of restrictions.

"It is recognised that the expansion of the prohibited list and the proposed further restriction on imports from the sterling area will bear hardly on certain sections of the community, but under present circumstances a certain further measure of austerity is inevitable if the Union is to live within its means."

America Cans Cocktail Sausages

The only cocktail wiener on the market to be packed in one container with its own sack of sauce has been introduced by Oscar Mayer and Co., of Madison, Wisconsin. This has been made possible by the invention of a duo-packaging method which prevents an interchange of food flavours within the can.

Specially suited for *hors d'oeuvres*, the new product comprises nineteen to twenty-three midget wieners packed in a double row round a separate sack of cocktail sauce, which can be served hot or cold, with the wieners or separately. Ready to eat from the can, the wieners can be served cold or may be heated by standing in hot water for a few minutes.

Alaska Salmon Cannery Wastes

Valuable drug and animal-feeding preparations may be available from fish waste, amounting to an estimated 100,000,000 lb. per annum, discarded by Alaska salmon canneries, according to a study by the Office of Technical Services, Department of Commerce, Washington.

Among investigations described in the study are the use of salmon eggs for the production of cholesterol, protein, and industrial fat; the vitamin content of experimental fish hatchery foods made from salmon waste; the use of salmon head oil in canning salmon; and the recovery of vitamin A oil.

New Animal Fodder

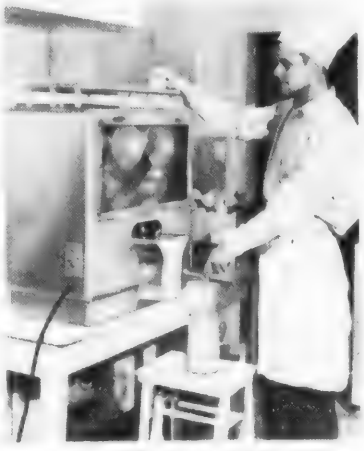
Every year 20,000 tons of lime-water are poured into the sea in Norway, despite the fact that it contains valuable food properties. For many years scientists have been working on the problem of finding a use for the lime-water—a residuary in the manufacture of herring oil. It is now reported that after twenty years' research, two Norwegian engineers, T. Tormodsen and T. Svendsen, have succeeded in producing from it a preparation which is rich in vitamins A, B, and D and is extremely valuable for animal fodder. The manufacturing process involves mixing the lime-water preparation with a certain animal fodder. It is hoped that production on a commercial basis will start in Stavanger this year.

Egg Preservation Development

A new, simplified, and cheap method of preserving eggs has been developed by Mr. K. P. Siggaard, a Danish inventor. Eggs preserved by this method will keep an almost unlimited time, their taste, odour, and appearance remaining unchanged.

The principle of the method is to expose the eggs to two shock-treatments through two separate, individual baths for exactly nine seconds each. The first bath is in boiling hot water and the second in a watery solution containing some non-toxic chemicals and casein. The first bath forms the film around the egg inside the shell, making it strong and durable. The second bath closes the pores of the shell and covers the film with a thin coating impervious to air and bacteria.

Steins Laboratorium, Copenhagen, which is authorised by the State of Denmark for the carrying out of tests and analyses of foods and chemicals, has tried out the method by storing the eggs in a thermostat at a constant temerature of 68° F. for up to two months and twenty days. All the undamaged eggs were quite fresh after this period, whereas the cracked eggs were rotten. The whites of the undamaged eggs could be whipped just as well as whites of new-laid eggs and the taste of the foam was the same. The eggs could be boiled, fried, poached, or whipped and the hydrogen-ion concentration of the whites remained almost unchanged.



Automatic fruit juice extractor.

Orange Juice on Tap

A new midget-size automatic juice extractor has been announced by the Fruit Extractor Manufacturing Co. of California, which automatically halves and reams oranges and lemons, and strains the juice for delivery through a sanitary faucet at a rate of from one glassful in a fraction of a minute up to 60 gal. an hour from average size oranges. The process is entirely visible through a transparent plastic window.

Normally fitted with a reamer which handles the four smaller sizes of fruit, additional drums and reamers are available and can be attached in a few minutes.

Food for Britain

According to Queensland's Premier, Mr. Edward Hanlon, the British Food Corporation intend to acquire another 69,810 acres for the food for Britain scheme.

He said that British food authorities had placed no limit on the amount of sorghum grain to be grown in Central Queensland.

The new property which the Cabinet has authorised the corporation to acquire will bring the total holding to about 883,810 acres.—*Reuter's Trade Service.*

Packaging Technology

The trend towards packed foods and other commodities is rapidly reducing bulk food selling in the United States, an important reason being the greater awareness by the consumer and seller alike of the importance of sanitation in the transporting, display, and handling of items.

Many United States firms are developing unusual packaging techniques, realising that merchandise that is attractively packaged will appeal to shoppers. One company, for example, has announced a new gravure process for packages, picturing in colour the contents of packages so realistically that the pictures look like the actual products.

Another company is offering a new paper bag in which fresh fruits and vegetables can be packaged in "take-home quantities" while they are still wet from washing or refrigeration. Made of paper that is strong even while it is wet, the bag is fitted with a window of Cellophane through which the contents can be seen by the purchaser. A similar bag, but without Cellophane, is being used widely to package cold beverage bottles, cartons of ice cream, and other wet or damp objects which seep through an ordinary bag.

Similar bags are now used to package a wide variety of products including potatoes, onions, ice cubes, coal, charcoal briquets, greenhouse plants, and dog food, on some of which phosphorus ink is used.

Waxed laminated Cellophane packs are used for frozen foods, tobacco, candy, nuts, and machine parts. Laminated packaging foil finds wide use in the drug, food, and chemical industries.

News from the Ministries

Prices of Sperm Oil

The prices of sperm oil have been reduced by £42 per ton. The new prices (naked *ex* works) are as follows:

Crude heads	£60
Blubber	£60
Carcass	£58
No. 3	£57

Aluminium and Metal Containers Decontrolled

All aluminium containers and the manufacture, marking, and use of all metal containers of one Imperial gal. and more are decontrolled by a Board of Trade Order which came into effect on March 11, 1949. The Order also makes relaxations of the marking restrictions on metal containers, including closures.

Food Pests Exhibition

An exhibition showing how the Ministry deals with rats, mice, and other animal and bird pests, and food insects, was recently staged by the Infestation Control Division of the Ministry of Agriculture and Fisheries.

The exhibition included types of food insects, with examples of the damage caused and the nature of the treatment given, so as to assist the identification of the various pests and encourage the general public to help local authorities in dealing with the problem.

Whale Meat Regulations

Regulations made by the Minister of Food and the Minister of Health provide that all whale meat imported for sale for human consumption shall be certified by a competent authority to show that it has been inspected and passed as fit for human consumption and has been prepared and handled under hygienic conditions. The regulations also contain provisions for securing the observance of hygienic conditions in the sale, transport, and handling of whale meat in this country

The Regulations, which came into force on March 20, will be enforced and executed by Local and Port Health Authorities.

Mineral Oil in Food

In view of the harmful effects which might result from the use of mineral oils, an Order has been made which prohibits their use as an ingredient in the manufacture of food for sale to the public.

Food Experts to Visit Turkey

In agreement with the Turkish Government a group of experts is being sent to Ankara to discuss with the Turkish Authorities long-term projects for agricultural development in Turkey with a view to increasing future exports of food to the United Kingdom.

Self-Service Shops

Arrangements have been made for licensing the structural alterations to a limited number of food shops selling groceries and provisions to enable them to be adapted to the "self-service" system.

Licences will be made available to private traders, multiples, and Co-operative Societies in proportions agreed with the Trade Associations or Parliamentary Committee of the Co-operative Congress. Save in very exceptional circumstances, the amount of licensable work may not exceed £3,000.

Transport for Potatoes

The transport restrictions in the Ware Potatoes (1948 crop) (No. 2) Order, 1948, have been amended with effect from March 13.

The ban on the movement of potatoes by rail into Lancashire and Cheshire, which was imposed so that the locally-grown potatoes of poorer keeping quality should be used up first, has now served its purpose and is withdrawn.

The Order also prohibits the movement of potatoes by road from Lincolnshire, Cambridgeshire (including the Isle of Ely), Soke of Peterborough, Bedfordshire, Huntingdonshire, and Norfolk into Glamorganshire, Monmouthshire, and Gloucestershire. This reinforces the existing prohibition on the movement of potatoes by rail into South Wales and the South-West of England, except from Herefordshire and Shropshire.

Price of Stockfeed Potatoes

From Monday, March 14, 1949, until further notice the Ministry's selling price for stockfeed potatoes will be reduced by £1 per ton. The new prices will be:

To merchants for resale—55s. per ton delivered loose, and 62s. 6d. per ton in sacks, plus deposit charge of 1s. per sack.

To stockfeeders—60s. per ton delivered loose in truckloads.

Orders and enquiries should preferably be made by users to their feedingstuff suppliers.

Import of Liquorice Juice

Arrangements have been made for a limited quantity of liquorice juice to be imported from Italy during 1949 under specific licence. Applications to import supplies from other countries will also be considered.

All applications should be accompanied by evidence of firm offers and should be submitted in duplicate on Form ILD/A to the Board of Trade, 189, Regent Street, W.1, *viâ* the Ministry of Food, Chocolate and Sugar Confectionery Division, Stanmore. Copies of the application form may be obtained from the Board of Trade at the above address or from any Customs Office.

Food from Holland

The following are particulars of the food items, so far as can be estimated at present, to be imported from the Netherlands during 1949:

	Tons.	*Value.* £
Milk products	—	11,750,000
Bacon ..	10,000	—
Eggs ..	15,800	—
Starches and starch products ..	58,650	—
Fresh fruit ..	37,000	2,800,000
Fresh vegetables ..	142,500	5,600,000
Preserved fruit and vegetables	—	4,812,000
Meat products, fish and fish products, game, etc.	—	3,079,000
Beers, liqueurs, etc. ..	—	550,000
Miscellaneous food items	—	4,393,000

Market Possibilities in Belgium

INCREASED DEMAND FOR FOODSTUFFS

At the meeting of the Anglo-Union Economic Committee Belgium and Luxembourg, the Union Economic Belgium and Luxembourg Delegation expressed the readiness of their Governments, in the framework of their general economic policy and in pursuance of the objectives of the Overseas European Economic Committee, to seek ways and means of increasing imports from the United Kingdom and other countries in the sterling area in substitution of imports from the dollar area. This decision will have considerable bearing on possibilities of expansion of United Kingdom exports to Belgium. It is anticipated that commodities for which an increased demand may result will include foodstuffs, in particular cake and pudding mixtures, spaghetti, macaroni, canned soups, high-class jams, pickles and sauces, and non-milk base infants' food.

United Kingdom firms should bear in mind that there will be some local competition and prices must, therefore, be competitive. On the other hand competition from the U.S.A. is likely to diminish. Interested firms are strongly advised to consider arranging for their representatives to visit and explore this market. They can be assured of every assistance being afforded by the Commercial Department, British Embassy, Brussels.

Changes in Export Licensing Control

Among those goods which will not require export licences from April 1, 1949, are cider, and fish of all kinds.

In Group 1, the word "cider" has been added to the list of exceptions to the item relating to beverages, and the item "Fish (including shell fish) of kinds used for food, fresh, frozen, salted, cured, or canned; fish roes and preparations made therefrom, and fish livers" has been deleted.

Other goods which will not require export licences are certain colouring matters and flavouring essences, some essential oils, and soap substitutes.

In Group 1, the following has been deleted: Colouring matter, flavouring essences and other materials, wholly or partly of sugar, molasses, glucose, or caramel, of a kind used in the manufacture of edible or potable products.

Among the items deleted in Group 3 are: Preparations, products and substances (whether or not exported as substitutes for soap) in respect of which there are in force licences granted by or on behalf of the Minister of Food under the Soap Substitutes (Labelling and Prices) Order, 1943 (*e*); also the following essential oils: Bergamot, birch tar, cedarwood, cloves, grapefruit, lemon, mandarin (tangerine), orange, pimento leaf, sandalwood, shiu (Ho).

Among the items added to the Second Schedule are: Colouring matter and flavouring essences (other than caramel and synthetic organic dyestuffs) of a kind used in the manufacture of edible or potable products.

Committee on Weights and Measures Legislation

Since the Committee on Weights and Measures Legislation was appointed in October of last year, Mr. A. Carruth, General Manager of the Dalziel Co-operative Society, and Mr. D. Bernard Morgan, J.P., President of the National Chamber of Trade and chairman of the Directors of a large departmental store in Cardiff, have been obliged to resign for personal reasons.

To fill these vacancies, the President of the Board of Trade has since appointed to the Committee Mr. F. W. Warwick, General Manager of the Royal Arsenal Co-operative Society, and Councillor J. Parkes, M.B.E., J.P., F.C.I.S., Secretary of the Bolton Chamber of Trade.

Mr. H. Bending, Secretary of the National Union of Scale Makers, has been appointed as an additional member of the Committee.

Nut Imports

From March 7, 1949, the Board of Trade have granted an Open General Licence which permits the nuts listed below to be imported without restriction:

Chestnuts and walnuts in shell consigned from France.

Chestnuts, filberts, and walnuts in shell consigned from Italy.

Almonds, chestnuts, and filberts in shell consigned from Spain.

Filberts in shell consigned from Turkey.

Meat Imports from France

French and British veterinary experts have discussed sanitary precautions in connexion with the export of meat from France to the United Kingdom. Complete agreement was reached on the necessary safeguards against foot and mouth and other animal diseases and it is hoped that, as soon as practical arrangements can be made, some exports of pig meat to this country may be possible.

Cooling of Ice Cream

After May 1 next ice cream manufacturers will no longer be able to plead the special defence that they have ordered but been unable to obtain the necessary apparatus in any proceedings for failure to instal suitable cooling apparatus, and it will be necessary for the requisite cooling apparatus to be installed in all premises where ice cream is manufactured other than from a complete cold mix.

This decision has been taken by the Ministry of Health after making enquiries into the supply position and consultation with representatives of the ice cream trade, as a result of which the Minister is satisfied that suitable cooling apparatus is now available in sufficient quantity to meet all the prospective demands of the trade.

The special defence was introduced in the Ice Cream (Heat Treatment, etc.) Regulations, 1947, because at that time there was a serious shortage of cooling apparatus. It was later extended until May 1, 1949, by the Ice Cream (Heat Treatment, etc.) Amendment Regulations, 1948, made jointly by the Minister of Health and Minister of Food.

Information and Advice

Flavourings for Sausages and Meat Pastes

B.3195. *We shall be obliged for some advice about the use of herbs and spices in the flavouring of meat and fish products. Could you give us some details about the use of essential oils in the place of the actual herbs and spices?* (London.)

Spices and herbs are used in the form of finely or coarsely powdered products, the former in general being preferable. Local tastes in the matter should be considered. In some parts of the country consumers like to see little dark-coloured specks of sage in sausages as providing evidence that they have been properly seasoned. In other parts these specks might be a cause of complaint.

In some seasonings, notably pepper, ginger, and capsicum, aromatic material is extracted from spices by means of suitable solvents, which are afterwards removed by evaporation, leaving behind thick oily products known as "oleoresins."

The distinction between essential oils and oleoresins is one of great importance. The pungency of pepper and ginger is due to non-volatile constituents of the spices, which are not present in their essential oils. Hence, while the characteristic flavours—as distinct from pungency—of these spices are well represented by their essential oils, the pungency is lost. When, as is usually the case, this pungency is desired, the essential oil must be replaced by the oleoresin.

There are certain definite advantages to be gained, save in special cases, by the use of essential oils and oleoresins in place of powdered herbs and spices for seasoning meat and fish products. In some cases the flavours of the oils are superior to those of the spices from which they are derived, or rather, they are not marred by associated unpleasant tastes. The clove, for example, contains about 12 to 13 per cent. of a tannin which gives the spice an astringent taste. Clove oil is entirely destitute of tannin, and, providing it has been carefully diluted, has a pure clove flavour.

Discoloration and the presence of undesired specks are avoided when essential oils and oleoresins are used for seasoning, for, although some of these products are themselves highly coloured, the quantities required are so small that this colour is without effect on the finished product.

Information Supplied

B.3248. *Manufacturers of Tintometer coloured glasses.* (London.)

B.3251. *Suppliers of butter flavour.* (Bombay.)

B.3253. *Suppliers of imported boiling chickens and salami.* (Yorks.)

B.3255. *Suppliers of ovens, boiling pans, frying ranges, pastry machinery, coffee making plant, cutting and shredding machinery, mashing machinery, dehydration plant, steam ovens, clarifiers, and washing machinery.* (Portugal.)

B.3256. *Suppliers of plant for the manufacture of coffee by atomisation and of antioxidants.* (France.)

B.3260. *Suppliers of an electric pea podding machine.* (Lancs.)

B.3262. *Manufacturers of culinary herb processing machinery.* (Leics.)

B.3263. *Manufacturers of ice cream wafers and cornets.* (Glam.)

B.3267. *Suppliers of an egg candling machine.* (Lancs.)

B.3272. *Manufacturers of homogenisers for preparation of vegetables and fruit pastes, vacuum type dehydrator for vegetable pastes, fruits, and greenstuffs, steam scalding apparatus for meat, fish, vegetables, and greenstuffs, and machine for reclaiming and purifying fats and oils resulting from frying and roasting operations* (London.)

B.3276. *Suppliers of machinery used in the manufacture of macaroni, spaghetti, and vermicelli.* (Egypt.)

B.3277. *Manufacturers of automatic volumetric filling machines.* (Egypt.)

B.3281. *British agents for the Chopin moisture tester.* (Lancs.)

B.3285. *Details of the physical properties of teaseed oil.* (London.)

B.3290. *Manufacturers of uncooked potato flour.* (Lancs.)

B.3291. *Suppliers of equipment for use in the manufacture of potato crisps.* (N. Ireland.)

B.3292. *Suppliers of sundries for the ice cream trade.* (Eire.)

B.3293. *Manufacturers of a machine for skinning onions.* (London.)

B.3294. *Suppliers of pocket refractometers.* (Eire.)

B.3295. *Manufacturers of apple peeling and coring machines.* (Lancs.)

B.3297. *Suppliers of metal lids.* (Staffs.)

B.3301. *Suppliers of the machinery necessary for the manufacture of block and crystal jellies.* (Hants.)

B.3304. *Suppliers of a weighing machine for automatically weighing individually frozen fruits and vegetables into cartons.* (Lincs.)

B.3309. *Suppliers of capsules for filling with flavouring essence.* (N. Ireland.)

B.3312. *Manufacturers of equipment for the processing of cocoa, cocoa butter, chocolate, and confectionery in general.* (Italy.)

B.3313. *Manufacturers of gelatine.* (S. Rhodesia.)

B.3314. *Suppliers of a pressure cooker to cook 2 cwt. of meat at one time.* (Lincs.)

B.3315. *Suppliers of stainless steel containers and buckets.* (London.)

B.3317. *Makers of a coffee slot machine.* (South Africa.)

CORRIGENDUM

In the April issue, page 191, under "Potato Crisps," it was stated that "the approximate output from a 24 in. by 22 in. gas pan is 60 lb. of crisps per hour." This should read: "A gas pan of 24 in. by 22 in. will handle approximately 60 lb. of *raw crisps* per hour."

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. 6d. weekly (annual subscription £3 15s.).

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 2s. each.

616,187. WHITTINGSLOWE, W. T.: Appliance for shelling peas.

616,321. MITCHAM FOOD PRODUCTS, LTD., and SCHAUL, M. C.: Process for the production of food preparations from potatoes and similar farinaceous tubers.

616,424. PENTECON, LTD., and HELDEN, W. VAN: Pressure cooker and steriliser.

616,553. KREISKY, K.: Machine for the manufacture of bread rolls and loaves.

616,732. MARSHALL, E. L.: Means for feeding batter to moulds in machines for making cones or biscuits for containing ice cream.

Abstract of a Recent Specification

Crystallised Glucose

The present invention relates to a continuous process for the preparation of glucose monohydrate by crystallisation where only a fraction of the mass partially crystallised in the crystalliser is drawn off, and where the volume drawn off is replaced by the same volume of solution to be crystallised, in particular of solution the purity of which does not exceed 86 per cent.

This process of continuous crystallisation has, in comparison with earlier discontinuous processes, greatly facilitated the manufacture of pure glucose, while lessening noticeably the danger of producing at the same time a mixture of anhydrous crystals and hydrated crystals. However, the quantity of pure glucose extracted from the boiled mass by this process has been relatively small.

In a process of this kind which has been operated in Belgium, the solution to be crystallised is introduced into the crystalliser at the temperature at which it leaves the evaporator, *i.e.* at 70° C., and the solution thus introduced into the crystalliser is allowed to cool down naturally.

A continuous process for the crystallisation of glucose has also been proposed in which the solution to be crystallised is cooled between its emergence from an evaporator, where it had been raised to a temperature of between 55·4° C. and 82·8° C., and its entry into the crystalliser.

The cooling of the solution to be crystallised in this cooler is such that after mixing the solution thus cooled with a mass partially crystallised previously which is at 26·7° C., the temperature of the mixture at the end of the crystallisation is still in the neighbourhood of 40·6° C. This latter temperature is maintained during a time sufficient to allow the crystallisation to get well started, and then the mixture in course of crystallisation is cooled so that at the end of the crystallisation the temperature may not exceed 26·7° C.

A discontinuous process has finally been proposed for the crystallisation of glucose in which the temperature of a small part only of the total quantity of glucose solution to be crystallised is lowered between 25° and 30° C.

When the crystallisation of this part is well advanced there is added to the latter a quantity of solution equal to six times the first and which is at a temperature of 57° to 60° C. The temperature of the mixture is therefore sensibly higher than that at the commencement of the first crystallisation. It is allowed to crystallise for a certain time further before adding a new quantity of solution equal to double the first amount and of which the temperature is also 57° to 60° C. It is allowed to cool gradually to the surrounding temperature during the crystallisation, which is carried out for several days.

607,124. *Glucoseries Réunies.*

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

PECTOZYME. — 664,954. Chemical substances, being enzymes for use in the clarification of fruit juices, for the conversion of starch and flour to syrups, for use in the manufacture of farinaceous foods, and for the destruction of starches occurring in fruit juices. **Norman Evans and Rais, Limited,** Dudley Road, City of Manchester; Colour and Chemical Manufacturers and Merchants.

ROCKY LEAP.—665,132. Canned fish. **A. J. Mills and Company, Limited,** Colonial House, Tooley Street, London, S.E.1; Manufacturers.

New Companies

Henry Simon, Limited. (463023.) Bird Hall Lane, Cheadle Heath, Stockport. To carry on business of flour milling, consulting, general and electrical engineers, etc. Nom. cap.: £100 in £1 shares. Dirs.: G. M. Anderson, North Leigh, Deane, Bolton; I. Hey, Glen Goyt, Strines, Derbyshire; J. F. Lockwood, Yew Tree, Combs, Chapel-en-le-Frith, Derbyshire; C. H. Marsh, G. H. Sugden, C. H. Wood, R. B. Potter, and Sir P. G. Hamilton, Bt.

Chocolatiers, Limited. (463038.) 22, Grove Road, Eastbourne, Sussex. To carry on business of manufacturers of and dealers in sweets, confectioneries, chocolate, etc. Nom. cap.: £100 in £1 shares. Dirs.: W. J. Maine and Mrs. L. Maine, Dittons Grange, Dittons Road, Eastbourne.

Sabbagh Brothers and Co. (London), Limited. (463066.) 17, Pudding Lane, E.C.3. To carry on business of manufacturers, preservers, packers, canners, tinners, and bottlers of produce, provisions, foodstuffs, etc. Nom. cap.: £1,000 in £1 shares. Permt. dirs.: A. G. Lillington, 21, The Crossways, Heston, Middlesex; E. Sabbagh, Michale Sabbagh, and V. Sabbagh, all of 156, Rue Thebes, Sporting, Alexandria, Egypt.

R. J. Crosby, Limited. (463095.) 2A, Llanrwst Street, Liverpool, 3. To take over business of a manufacturing confectioner carried on at 39A, St. Anne Street, Liverpool, by R. J. Crosby. Nom. cap.: £1,800 in £1 shares. Permt. dirs.: R. J. Crosby, 28, Childers Street, Liverpool; L. Parkin, Avalon, Preston New Road, Southport; A. Jones, 48, Trouville Road, Liverpool.

Baker's Oven (Falmouth), Limited. (463109.) Baker's Oven, Strand, Falmouth, Cornwall. To take over business of a restaurant proprietor, baker, confectioner, and ice cream manufacturer carried on at Falmouth by Barnard N. Wills. Nom. cap.: £3,000 in £1 shares. Dirs.: B. N. Wills (ch.) and A. E. J. Wills, Park Venton, Stracey Road, Falmouth.

Caddies Crisps, Limited. (463115.) 110, Hornsey Road, N.7. To carry on business of manufacturers of and dealers in foodstuffs, etc. Nom. cap.: £1,000 in £1 shares. Permt. dirs.: F. S. Cadman, 111, Upper Tollington Park, Stroud Green, N.4; M. Y. Ffrench-Williams, 81, Elm Bank Gardens, Barnes, S.W.13.

Three Counties Bakeries, Limited. (463760.) 33, Brazenose Street, Manchester. Nom. cap.: £50,000 in £1 shares (20,000 cum. pref., 20,000 cum. 2nd pref., and 10,000 ord.). Dir.: J. P. Hodgson, 25, Sedburgh Road, Kendal.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.